Summary of the 2004 British Columbia Sablefish (*Anoplopoma fimbria*) Research and Assessment Survey

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SUMMARY OF THE 2004 BRITISH COLUMBIA SABLEFISH (*Anoplopoma fimbria*) RESEARCH AND ASSESSMENT SURVEY

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ABSTRACT

Wyeth, M.R, Kronlund, A.R., and Elfert, M. 2006. Summary of the 2004 British Columbia Sablefish (*Anoplopoma fimbria*) research and assessment survey. Can. Tech. Rep. Fish. Aquat. Sci. 2660: ix + 74 p.

This document summarizes the methodology and results of the 2004 British Columbia sablefish research and assessment survey. The 2004 survey continued the time series of annual fall surveys initiated in 1988 and standardized beginning in 1990. Longline trap fishing was conducted at selected offshore and mainland inlet localities. Survey tasks were divided between two chartered commercial fishing vessels.

The standardized charter vessel conducted sets at nine offshore indexing localities and five mainland inlet localities. These sets provide a catch rate based abundance index used for stock assessment. In addition, sablefish were tagged and released from the sets fished in the mainland inlet localities.

The tagging charter vessel conducted tagging sets at six offshore tagging localities and nine offshore indexing localities. These traditional tagging sets followed protocols used since 1995. The tagging charter vessel also conducted 75 sets following a stratified random sampling design comprised of five spatial and three depth strata.

Catch rates achieved for some of the sets during the 2004 survey approached the historical highs recorded during the 2003 survey. The mean annual catch rate over all standardized sets at offshore localities was comparable to those observed in the early 1990s and slightly reduced from the 2003 mean. The traditional tagging sets also yielded some of the highest catch rates of the time series although the mean catch rate for all traditional tagging sets was modestly lower than that observed in 2003. Catch rates for the mainland inlet standardized sets were some of the highest on record and were similar to the catch rates observed in 1999 and 2003.

As with the traditional survey catch rates, there was a modest reduction in the overall catch rates for the 2004 stratified random survey sets when compared to results from 2003. The pattern of catch rates in 2004 among the random design depth strata was similar to that observed in 2003. High variability was observed in the shallow stratum, the highest catch rates in the middle stratum, and the lowest catch rates and associated variability in the deep stratum.

Of the 55,462 sablefish captured during the 2004 survey, 19,039 were tagged and released, 294 previously tagged sablefish were recovered, and 10,379 fish were sampled for biological data.

RÉSUMÉ

Wyeth, M.R, Kronlund, A.R., and Elfert, M. 2006. Summary of the 2004 British Columbia Sablefish *(Anoplopoma fimbria)* research and assessment survey. Can. Tech. Rep. Fish. Aquat. Sci. 2660: ix + 74 p.

Ce document fait la synthèse des méthodes et des résultats du relevé de recherche et d'évaluation de la morue charbonnière de la Colombie-Britannique effectué en 2004. Ce relevé s'ajoute à la série chronologique des relevés d'automne annuels qui ont commencé en 1988 et ont été normalisés à partir de 1990. Le relevé a été effectué par deux bateaux de pêche commerciale affrétés et a consisté à pêcher la morue au moyen de casiers fixés à des lignes de fond dans des endroits choisis au large et dans des bras de mer continentaux.

Un des bateaux affrété a effectué la pêche indicatrice normalisée à neuf stations au large et à cinq stations dans des bras de mer continentaux pour obtenir un indice d'abondance fondé sur les taux de capture, à des fins d'évaluation des stocks. En outre, des morues capturées dans les bras de mer continentaux ont été marquées et libérées.

L'autre bateau affrété a servi à capturer des morues pour le marquage à six stations au large et à pratiquer la pêche indicatrice à neuf stations au large. Les mouillages de casiers ont été réalisés selon le protocole utilisé pour le marquage depuis 1995. Ce bateau a également effectué 75 mouillages de casiers selon un plan d'échantillonnage aléatoire stratifié de cinq strates spatiales et de trois strates de profondeur.

Les taux de capture pour une partie des mouillages en 2004 se rapprochaient des pics historiques obtenus en 2003. Le taux de capture annuel moyen pour l'ensemble des mouillages normalisés au large se comparait à ceux observés au début des années 1990, quoiqu'il était légèrement moins élevé qu'en 2003. Les taux de capture pour les mouillages de marquage s'inscrivaient parmi les plus élevés de la série chronologique, quoique le taux moyen pour l'ensemble de ces mouillages était légèrement moins élevé qu'en 2003. Les taux de capture pour les mouillages de pêche indicatrice dans les bras de mer continentaux étaient parmi les plus élevés qui aient été enregistrés et correspondaient à ceux observés en 1999 et en 2003.

Comme dans le cas des taux de capture pour les mouillages de pêche indicatrice au large, le taux de capture global pour les mouillages aléatoires stratifiés était légèrement moins élevé qu'en 2003. La trajectoire des taux de capture dans les strates échantillonnées aléatoirement se comparait à celle observée en 2003 : les plus variables ont été obtenus dans la strate peu profonde, les plus élevés dans la strate centrale et les plus faibles, variables également, dans la strate profonde.

Des 55 462 morues charbonnières capturées, 19 039 ont été marquées et relâchées, 294 morues charbonnières marquées lors d'années antérieures ont été recapturées, et 10 379 ont été échantillonnées pour obtenir des données biologiques.

1.0 INTRODUCTION

Sablefish (*Anoplopoma fimbria*) are an abundant and commercially valuable species throughout their range in the North Pacific. They have a long history of exploitation in Canadian waters with landings reported as early as 1900 (McFarlane and Beamish 1983). British Columbia fishermen harvest sablefish with longline trap, longline hook, and trawl gear along the continental shelf at depths up to 1800 m. The British Columbia sablefish fishery landed approximately 4000 metric tons annually for the period 1993 to 2003. The majority (>75%) of the fish were captured using trap gear.

In 1988 an annual sablefish research and assessment survey of the British Columbia coast was initiated. An overview of how the annual sablefish survey has expanded and changed over the years is provided by Wyeth and Kronlund (2003) and Wyeth et al. (2004b). For specific details on surveys conducted from 1988 through 1993, see Smith et al. (1996); for surveys in 1994 and 1995 see Downes et al. (1997); for surveys from 1996 to 2000 see Wyeth and Kronlund (2003), for the 2001 survey see Wyeth et al. (2003), and for the 2002 and 2003 surveys see Wyeth et al. (2004a and 2004b respectively). Each year, fishing was conducted at selected localities using trap gear consistent with the commercial fishery. The fishing protocol was refined over the first few years of the survey and was standardized beginning in 1990. These standardized sets (which have been referred to as "indexing" sets in previous survey reports) were intended to track trends in abundance and biological characteristics at the survey localities. Sablefish from standardized sets were tagged and released beginning in 1991. In 1994, sets with the sole purpose of capturing sablefish for tag and release were added at the existing localities. In 1995, additional localities were added to the survey specifically for tagging sets. These localities are referred to as tagging localities while the initial survey localities are referred to as indexing localities. A pilot stratified random design was introduced for the 2003 survey with the dual purposes of random release of tagged fish and development of a second stock abundance index.

The 2004 sablefish research and assessment survey was comprised of two main components. First, the existing 1990 to 2003 standardized survey time series was continued for 2004 and followed the established protocols for fishing gear, catch monitoring, biological sampling, and tagging. Standardized sets were conducted at nine offshore indexing localities and five mainland inlet localities while tagging sets were conducted at nine offshore indexing localities and at six offshore tagging localities. Second, the stratified random sampling design initiated in 2003 was re-randomized and repeated in 2004 with a total of 75 sets conducted in five spatial strata and three depth strata.

This document summarises the methods and results of the 2004 survey program and consists of a main body of text with supporting appendices. Tables and figures referred to in the main text are sequentially numbered. Tables and figures in the appendices are labelled with the letter code of the appendix and a sequential number, e.g., Table A.2 for the second table in Appendix A.

2.0 METHODS

The 2004 sablefish research and assessment survey included both a traditional component and a stratified random survey design component. Table 1 summarizes the survey components,

charters, locations, and set types completed during the 2004 survey. The traditional component followed protocols that have evolved over the 17 year life of the annual survey. Fishing was conducted at selected offshore and mainland inlet localities along the British Columbia coast. The offshore localities can be split into indexing localities and tagging localities based on the history of this survey. Two types of sets were fished as part of the traditional component of the 2004 survey: (1) standardized sets with rigorous gear specifications that were used to collect catch rate data intended to index trends in abundance and to obtain fish for biological sampling, and (2) tagging sets with less rigorous gear requirements that were designed to capture sablefish for tag and release. The standardized sets were formerly referred to as "indexing" sets (see Wyeth and Kronlund 2003). The protocol for standardized sets evolved over the first few years of the time series and beginning in 1990 they were conducted annually using a consistent protocol. In contrast, practices for tagging sets were variable prior to 1996, but specifications introduced in 1996 have been used consistently through to the 2004 survey. For the traditional component of the 2004 survey, standardized sets were made at offshore indexing and mainland inlet localities while tagging sets were made at offshore indexing and offshore tagging localities.

The second component of the 2004 survey employed a stratified random sampling (StRS) design (Table 1). The objectives of the StRS survey are to distribute tag releases at random over the survey area and to develop a catch rate based index of stock abundance as an alternative, and possible successor, to the standardized protocol described above. The StRS survey was piloted in 2003 and repeated in 2004. The StRS survey design allocated a total of 75 sets to five spatial and three depth strata, with five replicates for each combination of area and depth.

2.1 SURVEY VESSELS

The 2004 survey tasks were split between two chartered vessels. The F/V Ocean Marauder conducted the "standardized charter" which consisted of standardized sets at offshore indexing localities and at mainland inlet localities (Table 1). The F/V Milbanke Sound conducted the "tagging charter" which included traditional tagging sets in offshore indexing and offshore tagging localities as well as the StRS survey sets (Table 1).

The F/V Ocean Marauder, skippered by Albert Melnychuk, completed a total of 84 sets from October 5 to November 3, 2004 (Table 2). Detailed information for each set is listed in Appendix A. The F/V Milbanke Sound, skippered by Don Quast, completed a total of 95 sets from October 5 to November 15, 2004 (Table 2). Detailed information for each set is listed in Appendix B.

2.2 TRADITIONAL SURVEY

2.2.1 Localities

Skippers were directed to make sets within the geographic boundaries of the traditional survey localities (Figure 1, Table 3, and Table 4).

2.2.1.1 Offshore Indexing Localities

Nine offshore indexing localities were visited in 2004 (Table 5, Figure 1 through Figure 4). From north to south they were Langara Island-North Frederick, Hippa Island, Buck Point,

Gowgaia Bay, Cape St. James, Triangle Island, Quatsino Sound, Esperanza Inlet, and Barkley Canyon.

2.2.1.2 Offshore Tagging Localities

Six offshore tagging localities were visited in 2004 (Table 5, Figure 1 through Figure 4). From north to south they were Rennell Sound, Tasu Sound, Middle Ground, Pisces Canyon, Estevan Point, and Father Charles Canyon.

2.2.1.3 Mainland Inlet Localities

Four mainland inlet localities were visited in 2004. From north to south they were Portland Inlet, Gil Island, Finlayson Channel, and Dean/Burke Channel (Table 5, Figure 1). Prior to 2002, the skippers were directed to make five sets in each inlet locality and no specific locations were given. Nonetheless, there was a fair degree of consistency in the spatial distribution of the set locations within each inlet among years. In 2002, five locations were chosen within each inlet locality to ensure consistency with the positions of sets conducted in previous years. The locations were described to the charter skipper in 2002 but no geographic limits were supplied (Wyeth et al. 2004). Beginning in 2003, the skipper was again directed to make one set in each of the five locations within an inlet, and the geographic boundaries of the locations were specified (Figure 5, Table 4).

2.2.2 Depth Intervals

Within the offshore localities, the skipper had discretion over the exact location of all sets provided the sets were made in the specified depth intervals (Table 6). One standardized set was made in each of the following seven depth intervals at each offshore indexing locality in 2004 (D0 to D6, respectively): 91-274 m (50-150 fm), 274-457 m (150-249 fm), 457-641 m (250-349 fm), 641-824 m (350-449 fm), 824-1006 m (450-549 fm), 1006-1189 m (550-649 fm), and 1189-1389 m (650-749 fm). Only five depth intervals (D1-D5) were fished at each of the indexing localities at the outset of the time-series in 1990. From 1999 to 2001 these core intervals were supplemented with additional deep depth intervals at selected indexing localities and at other locations (Wyeth et al. 2004). In 2002, two deep depth intervals (D6-D7) were defined and corresponding deep sets were made at each indexing locality. Beginning in 2003 and continuing in 2004, the deepest depth interval (D7, 1372-1827 m, 750-999 fm) was only fished at the Barkley Canyon locality while a shallow depth interval (D0) was fished at all localities.

Most sablefish tagged and released from offshore areas since 1995 were captured during traditional (Type 1) tagging sets. In order to maintain continuity with historical tagging practices, the 2004 survey included Type 1 tagging sets targeted at depths of 457-824 m (250-450 fm) where the highest catch rates were expected (Table 6). One or two Type 1 tagging sets were fished at each of the six offshore tagging localities and a single Type 1 tagging set was made at each of the nine offshore indexing localities.

Sets at the mainland inlet localities were made at the prevailing depth of the set location (Table 6). Fishing within specific depth intervals was not possible because of the steep-sided bathymetry of the inlets. One set was made in each of the locations defined in Table 4 (Figure 5) for a total of five sets in each of the four inlet localities.

2.3 STRATIFIED RANDOM SAMPLING SURVEY

The stratified random sampling (StRS) survey followed the same sampling design, gear specifications and fishing methods as used in 2003. The survey was conducted in the offshore area of the British Columbia coast. Five spatial strata and three depth strata were used to partition the survey area (Table 7, Figure 6). Canadian Hydrographic Service natural resource maps of coastal British Columbia were used to define the depth strata. Three depth strata (Table 7) were selected to demarcate the shallow (183-457 m, 100-250 fm), main (457-824 m, 250-450 fm), and deep (824-1372 m, 450-750 fm) depth ranges of the commercial trap fishery. Note that typographical errors in the 2003 survey report (Wyeth et al. 2004b) incorrectly specified the upper limit of the shallow depth interval as 91 m (50 fm). The StRS survey spatial strata boundaries were determined by examining large scale bathymetric features, spatial patterns of commercial trap fishing effort, and the relative areas of the spatial strata (Figure 6, Table 7). Based on the resolution of the bathymetry data and the estimated length of a string of 25 traps (approximately 1200 m), a 2 km by 2 km grid was used to define the sampling units in the survey area. Each possible sampling unit within the 15 strata was assigned a unique identification number. Five sampling units were randomly selected from all possible 2 km by 2km units within each of the 15 combinations of spatial and depth strata. This selection provided a total of 75 sets (Figure 2 through Figure 4).

One StRS design set (or Type 3 tagging set) was made at each selected sampling unit. The charter skipper was directed to set as much of the gear as possible within each selected 2 km by 2 km block providing the actual bottom depth at the set location was within the specified depth strata. The accuracy and resolution of the bathymetry data used to identify the depth stratum of each block is limited in some areas. Thus, it is possible that upon visiting a selected block, the specified depth range of that block may not be found. If such a situation is encountered, or if the bottom relief precluded fishing, the skipper was directed to make the set in an adjacent sampling unit. Specifically, the set was to be deployed in the sampling unit directly to the east or west of the selected sampling unit. If those alternatives proved unworkable, sampling units to the north and south of the intended sampling unit were to be attempted.

2.4 FISHING GEAR AND OPERATIONS

The fishing gear and operations used in 2004 were consistent with the protocol of surveys from 1990 onwards (Wyeth and Kronlund 2003). All sets were made using each charter vessel's longline trap gear which was typical of that employed in the commercial sablefish trap fishery. See Wyeth and Kronlund (2003) and Appendix I for a more detailed description of the survey fishing gear and setting and hauling procedures. Briefly, a set or "string" of longline trap gear consisted of a line resting on the ocean floor (groundline) with baited traps attached at 46 m (25 fathom) intervals along its length (Figure 7). The groundline was secured to the ocean floor by anchors at each end and the location of the string was marked by floats attached to the groundline by anchorlines.

The F/V Ocean Marauder used traps with black web and two stainless steel escape rings with internal diameters of 98 mm ($3\ ^{7}/_{8}$ inch). Some traps were new to the charter vessel and had not been fished so there was still web covering the escape ring openings while the older traps had orange twine laced across the escape ring opening.

The F/V Milbanke Sound used traps with black web and two stainless steel escape rings with orange twine laced across the opening. The vessel skipper reported that the escape rings had internal diameters of 98 mm ($3\ ^{7}/_{8}$ inch).

Standardized sets were fished with strings of 25 traps, each trap baited with approximately 1 kg of frozen squid in a bait bag. The species of squid used was not determined. All tagging sets were baited with a combination of a 1 kg block of frozen squid in a bait bag and approximately 3 kg of frozen Pacific hake (*Merluccius productus*) loose in the trap. Type 1 tagging sets consisted of strings of approximately 65 traps while the StRS survey Type 3 tagging sets each fished 25 traps.

The start and end positions of each set were recorded from the vessel's global positioning system (GPS) when the first and last anchors were set over the stern. The start and end bottom depths were recorded from the vessel's depth sounder when the respective anchors were set. The mean bottom depth of the set was calculated as the average of depth recordings from the vessel's depth sounder at one-minute intervals between the first and last anchors being set. The duration, or soak time, of the set was calculated as the time elapsed between the first anchor being set over the stern and the first anchor hauled aboard. Figure C.1 shows an example of a completed bridge log data form. In addition to the bridge log, science staff also observed each set from the deck and completed a set log (Figure C.2). Figure C.3 and Figure C.4 are deck diagrams for the F/V Ocean Marauder and F/V Milbanke Sound, respectively. The diagrams show how the deck space was used for survey tasks.

2.5 CATCH AND EFFORT DATA COLLECTION

The catch of all species in each trap was counted and weighed. All catch weights were taken using a Marel M1100 portable, motion-compensating electronic platform scale. Small catches of small animals weighing less than 1 kg were counted but not always weighed whereas large catches of such small animals were weighed but not always counted. Effort data was calculated by tallying each trap as it was hauled aboard. Any damage to a trap was noted and the necessary repairs were affected by the vessel crew before the trap was set again. Figure C.5 shows an example of a completed catch log form. Data recorded on the catch log forms were transcribed to data entry forms to allow easier entry into electronic format (Figure C.6).

2.6 CATCH PROCESSING

2.6.1 Biological Samples

Sablefish were sacrificed and sampled after each set was completely hauled aboard. The fish were measured for fork length (L) in millimetres (mm) and, if weather conditions permitted accurate measurements, the whole body weight (W) was recorded in grams (g) or kilograms (kg). The abdominal cavities were opened and the gonads were examined to determine the fish sex (S) and to visually estimate the state of maturity (M, see Appendix D). Sagittal otoliths (O) were collected for subsequent age determination. The otoliths were excised from the fish, cleaned, and stored in 50% glycerine and 3% thymol solution in Tres Bien plastic trays. Figure C.7 and Figure C.8 show examples of completed sablefish biological sampling forms. A type of biological sample is characterized using the letter abbreviations of the variables, e.g., LWSMO indicates that length, weight, sex, maturity, and otoliths were collected for the sample.

Sometimes fish weight cannot be reliably collected to vessel motion and direct effects of wind on the scale, so the notation L(W)SMO indicates that weights were attempted but may not be available for all samples.

2.6.2 Recovered Tagged Sablefish

Previously tagged sablefish recovered during the 2004 survey were re-released. The tag number was recorded on deck and the fork length was measured in mm. However, if a previously tagged sablefish was in poor condition, it was sacrificed and sampled for LS(W)MO after each set was completely hauled aboard. Figure C.9 shows an example of a completed recovered sablefish sampling form.

2.6.3 Tagging Procedures

Fish to be tagged were transferred from the sorting area using plastic baskets to a 2,400 litre fibreglass holding tank secured to the vessel's deck. The tank received a continuous supply of fresh seawater drawn from the surface via the vessel's fire pump system. Fish were removed from the holding tank by hand or with a dip-net and then measured for fork length (mm) on a wooden measuring board. The tag was inserted on the left side of the fish at the base of the dorsal fin using a Mark II Long Tagging gun. The tag was injected approximately 1 cm below and 2-3 cm behind the anterior insertion of the first dorsal fin. The tag was angled into the fish so the tag could stream and the vertebral column and internal organs would not be damaged. Any significant injuries to the fish were recorded prior to the fish being released. Figure C.10 shows an example of a completed tagging form.

2.6.3.1 Tag Type

All sablefish were tagged using a Floy FD-94 T-bar anchor tag. The information printed on the tag appeared as:

CSA REWARD PACIFIC BIO. STATION
NANAIMO, B.C. CANADA *## ### ###

where "*" is a letter and "#" is any single integer from 0 to 9, e.g. A00 123 456.

2.6.4 Standardized Sets At Offshore Indexing Localities

The goal for standardized sets conducted at offshore indexing localities was to obtain a LS(W)MO sample of at least 50 sablefish per set and a LSM sample of 80 to 100 fish per set. For each set, traps were allocated to each biological sample with the objective of distributing the selected traps along the entire length of the string. The specific selection method depended on the sablefish catch rate and varied from every trap, to every second or third trap, to a selection of traps spaced throughout the string. Prior to hauling each set, the first trap assigned to each sample was determined using a random number table. All the sablefish from each selected trap were included in the same sample. Fish from traps that were not allocated to either the LS(W)MO or LSM biological sample were processed as commercial catch. Specifically, the unused fish were "discarded" by the science staff and then sorted by the vessel crew. Small fish were released alive while large fish were kept and dressed to be landed as commercial catch.

For example, suppose the average catch rate was 10 fish per trap and trap 3 was selected for the LS(W)MO sample and trap 2 was selected for the LSM sample. The catch of traps 3, 9, 12, 18, and 24 would be allocated to the LS(W)MO sample while the catch of traps 2, 5, 8, 11, 14, 17, 20, and 23 would be allocated to the LSM sample. The catch from the remaining traps would be processed as commercial catch. Figure C.7 shows an example of a completed LS(W)MO sampling form and Figure C.8 shows an example of a completed LSM sampling form. Appendix E lists how the sablefish catch from each trap was allocated for each set during the standardized charter.

2.6.5 Standardized Sets At Mainland Inlet Localities

The goal for standardized sets conducted at mainland inlet localities was to tag and release fish in proportion to the catch for each set. Sets were numbered sequentially and the sablefish catch from even-numbered traps fished on even-numbered sets was tagged. Conversely, the catch from odd-numbered traps fished on odd-numbered sets was tagged. All the sablefish from traps selected for tagging were tagged. The sablefish from the remaining traps (odd-numbered traps for even-numbered sets and even-numbered traps for odd-numbered sets) were used to obtain a LS(W)MO sample of at least 50 fish per set. Fish in excess of the biological sampling requirements were processed as commercial catch. An attempt was made to spread the traps selected for the biological sample along the entire length of the string. All the sablefish from each selected trap were included in the biological sample. Appendix E lists how the sablefish catch of each trap was allocated for each set during the standardized charter.

2.6.6 Type 1 Tagging Sets

Biological samples were not collected during Type 1 tagging sets. The goal of the Type 1 tagging sets was to tag and release a total of 1000 sablefish in each of the six offshore tagging localities and 300 fish in each of the nine offshore indexing localities. Once the goal had been achieved in a locality, tagging was discontinued and the remainder of the sablefish were processed as commercial catch. Occasionally, the catch rates were sufficiently high that the tagging operation could not keep up with the hauling. In such an event, hauling was either suspended or the catch of some traps were discarded until there was room available in the tagging tank and fish could again be directed to the tagging operation.

The Rennell Sound offshore tagging locality and the Hippa Island offshore indexing locality overlap almost completely (Figure 1). The set designated for Rennell Sound did not capture the required 1000 fish while the set designated for Hippa Island captured in excess of the required 300 fish. Instead of making another set designated for Rennell Sound, additional fish from the Hippa Island set were tagged and released such that a total of 1300 fish were released in the combined Rennell Sound / Hippa Island locality.

2.6.7 Type 3 Tagging Sets

For Type 3 sets, the catch from approximately $^1/_3$ of the traps was used for tagging, $^1/_3$ for biological samples and $^1/_3$ processed as commercial catch. Prior to hauling, the first trap of each set was randomly assigned to either commercial catch (D), biological samples (A), or tagging (T). Subsequent traps were assigned the next sequential category following the order commercial, biosample, tagging (DAT). For example, if trap 1 was assigned to be tagged (T), trap 2 was processed as commercial catch (D), trap 3 was used for the biological sample (A), trap 4 was

tagged (T), etc. The sampling goal of the Type 3 tagging sets was to obtain a 50 piece LS(W)MO biological sample with the objective of distributing the traps selected for the sample along the entire length of the string. For sets with low catch rates, some (or all) of the traps assigned to be processed as commercial catch were allocated to the biological sample. For sets with high catch rates, some traps assigned to the biological sample were processed as commercial catch if it was clear that the biological sampling requirement would be exceeded. In every case all the sablefish in each trap were utilized for the assigned purpose, i.e., biological sample or tagging. Appendix F lists how the sablefish catch of each trap was used within each set of the StRS survey.

2.7 OCEANOGRAPHIC SAMPLING

A Seabird SBE 39 temperature and depth logger was attached inside a trap on selected sets deployed by the standardized charter vessel. These data will be summarised elsewhere.

3.0 RESULTS

3.1 CATCH RATES

The annual distributions of set catch rates (number of sablefish/number of traps) are summarised by boxplots in Figure 8 for (1) standardized sets conducted at offshore indexing localities, (2) standardized sets conducted at mainland inlet localities, and (3) Type 1 tagging sets conducted at both offshore tagging localities and offshore indexing localities. The lower bound of the box indicates the first quartile (25^{th} percentile) of the data and the upper bound of the box indicates the third quartile (75^{th} percentile). The horizontal line that divides the box is the median (50^{th} percentile). The upper and lower whiskers are positioned at 1.5 times the inter-quartile range. Open circles indicate data values that fall outside the whiskers, or outliers. The lightly shaded rectangle positioned in each box represents an approximate 95 percent confidence interval for the sample median. Solid circles indicate the mean catch rate for each year. The nominal data are presented here with no attempt to filter data or standardize for any factors. All traps that could have captured fish were included in the calculation of catch rates. For example, holed or fouled traps were included while open traps were excluded. In some cases complete sets from previous surveys were excluded from the catch rate plots. For example, set types other than standardized and tagging sets, or sets where the total catch was not recorded are not represented in Figure 8. The fishing protocol has varied over the time period shown (Wyeth and Kronlund 2003, Wyeth et al. 2004b). Specifically, the more recent surveys have spanned a greater depth range than the early surveys. The 1988 and 1989 catch rates are not shown as the fishing protocols were significantly different than subsequent surveys, with much longer strings and different baiting practices (Wyeth and Kronlund 2003).

High catch rates were achieved during standardized sets at offshore indexing localities until 1993, but from 1994 to 2000, catch rates were consistently at a lower level (Figure 8, top panel). The 2001 survey yielded the lowest mean standardized catch rate and also exhibited significantly reduced variability. In 2002, catch rates were at levels similar to those achieved in the late 1990s and in 2003 the mean catch rate was near highs observed in the early 1990s. The highest individual set catch rates of the time series were observed in 2003. The mean catch rate of the 2004 survey was slightly lower than that observed in 2003, although some individual sets in 2004 achieved near-record high catch rates.

In years when both standardized sets and Type 1 tagging sets were conducted at offshore localities, the catch rates for tagging sets were greater (Figure 8). This may be due to the target depths and locations of the traditional tagging sets but it may also be due to the addition of Pacific hake to the bait load which is reported by industry to increase trap efficiency. Catch rates from the 2004 Type 1 tagging sets were lower than those achieved in 2003. This reduction was greater than difference between the 2003 and 2004 mean catch rates observed for offshore standardized sets.

Catch rates of standardized sets conducted at mainland inlet localities have remained relatively consistent among years with the highest catch rates observed in 1998, 1999, 2003, and 2004 (Figure 8). Unlike the standardized sets at offshore localities and Type 1 tagging sets, the standardized sets at inlet localities had slightly higher mean catch rates in 2004 than in 2003.

The range of catch rates for the stratified random design survey was similar to the range of catch rates from the traditional survey for both 2003 and 2004 (Figure 8 and Figure 9). The pattern of catch rates among the depth strata was the same in both 2003 and 2004. Specifically, high variability was exhibited in the shallow stratum, the highest catch rates were achieved in the middle stratum, and the lowest catch rates, and associated variability, were obtained in the deep stratum. The mean catch rates from the shallow and middle depth strata were lower in 2004 than in 2003. In contrast, the deep stratum exhibited higher catch rates in 2004 relative to those achieved the previous year. Catch rates from all three depth strata appear less variable in 2004 than in 2003. Catch rates were lower and less variable in 2004 than in 2003 for all spatial strata except southern Vancouver Island (S_1 in Figure 8).

3.2 CATCH COMPOSITION

Forty-seven species or taxonomic groups were represented in the catches from standardized sets conducted at offshore indexing localities (Table 8). Other than sablefish, the most common species in order of total weight captured were arrowtooth flounder (*Atheresthes stomias*), lingcod (*Ophiodon elongatus*), giant grenadiers (*Albatrossia pectoralis*), rougheye rockfish (*Sebastes aleutianus*), Pacific halibut (*Hippoglossus stenolepis*), and Pacific grenadiers (*Coryphaenoides acrolepis*). Other species accounted for minor fractions of the total catch.

Twelve species or taxonomic groups were represented in the catches from standardized sets conducted at mainland inlet localities (Table 9). Other than sablefish, the most common species in order of total weight captured were Pacific halibut (*Hippoglossus stenolepis*) and Pacific sleeper shark (*Somniosus pacificus*). Both Pacific halibut and Pacific sleeper sharks captured in trap gear were generally large fish, so that the total number of individuals captured in the inlets was relatively minor at 63 and 6, respectively. Other species accounted for minor fractions of the total catch

Nineteen species or taxonomic groups were represented in the catch from Type 1 tagging sets (Table 10). Other than sablefish, the most common species in order of total weight were rougheye rockfish (*Sebastes aleutianus*) and arrowtooth flounder (*Atheresthes stomias*). Other species accounted for minor fractions of the total catch.

Thirty-eight species or taxonomic groups were captured during the StRS survey (Type 3 tagging sets, Table 11). Other than sablefish, the most common species in order of total weight were arrowtooth flounder (*Atheresthes stomias*), dogfish (*Squalus acanthias*), lingcod (*Ophiodon elongatus*), rougheye rockfish (*Sebastes aleutianus*), Pacific halibut (*Hippoglossus stenolepis*), Pacific grenadiers (*Coryphaenoides acrolepis*), and giant grenadiers (*Albatrossia pectoralis*). Other species accounted for minor fractions of the total catch.

Although sablefish do not always dominate the catch for the shallowest and deepest depths fished, the overall catch of other species in both number and weight is minor relative to sablefish for all set types in all areas. This may be due to the selectivity characteristics of trap gear and to the depths fished during the survey. The differences in the species composition among the set types conducted in 2004 may be explained in part by the range of depths fished. For example, the standardized sets in offshore localities captured more grenadiers and lingcod than the offshore Type 1 tagging sets. This may be because the standardized sets were fished over a broader depth range and at a relatively deeper mean depth than the Type 1 tagging sets. Differences in catch composition could also be attributed to the Pacific hake and squid bait used by the tagging charter compared to the standardized charter which used squid only.

3.3 SABLEFISH SAMPLING AND TAGGING

Of the 39,114 sablefish captured during the 2004 traditional survey, 20,802 were either tagged or used for biological sampling (Table 12). A total of 13,470 sablefish were tagged and released with 3,224 of the total releases from offshore indexing localities, 5,377 from offshore tagging localities, and 4,869 from the inlet localities. In addition, 7,100 sablefish were sampled for length, sex, and maturity state. Otoliths were collected from 3,584 sablefish while 2,309 sablefish were weighed. A total of 232 previously tagged sablefish were recovered during the 2004 traditional survey.

Of the 16,348 sablefish captured during the 2004 random design survey, 8,910 were either tagged or used for biological sampling (Table 13). A total of 5,569 sablefish were tagged and released and 62 previously tagged sablefish were recovered. In addition, 3,279 sablefish were sampled for length, sex, maturity state, and otoliths. No individual fish weights were collected during the 2004 tagging charter due to a malfunctioning scale.

Overall, both the traditional (Table 14) and stratified random (Table 15) surveys had proportionately fewer males than females but the sex ratio varied by both area and depth. The proportions of males ranged between 25 and 53 percent among the traditional localities. Proportionally fewer males were seen at all localities except Triangle Island where 53 percent of the sampled fish were male. The sex ratio in the random spatial strata over all depth strata ranged from 37 to 56 percent males and proportionately fewer males were only seen in the strata off Vancouver Island (S_1 and S_2). The sex ratio in the random depth strata over all spatial strata ranged from 35 to 58 percent and proportionately fewer males were seen in both the shallow and deep strata. The apparent difference between the random design and the traditional survey may be explained by the broader range of depths fished during the standardized component of the traditional survey. The mean fork length of females was greater than that of males at all the traditional survey localities (Table 14) and within all the StRS strata except for the shallow depth

(RD_1) in area S_4 (Table 15). This result may be influenced by the small sample size of 17 fish for that stratum (Table 13).

Details on the number of sablefish captured, sampled, and tagged for each set are shown in Appendix G for the standardized survey charter and Appendix H for the tagging charter.

4.0 ACKNOWLEDGEMENTS

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5.0 REFERENCES

Downes, A.J., W.T. Andrews, M.S. Smith, M.W. Saunders, and G.D. Jewsbury. 1997. Cruise details of sablefish (*Anoplopoma fimbria*) surveys conducted in B.C. waters, 1994-1995. Can. Data. Rep. Fish. Aquat. Sci. 1007: 106 p.

McFarlane, G.A. and R. J. Beamish. 1983. Overview of the fishery and management strategy for sablefish (*Anoplopoma fimbria*) off the west coast of Canada. p.13-35. *In* Proceedings of the Second Lowell Wakefield Fisheries Symposium, Anchorage, AK, Alaska Sea Grant Report 83-3.

Smith, M.S., Saunders, M.W. and W.T. Andrews. 1996. Cruise details of sablefish (*Anoplopoma fimbria*) surveys conducted in B.C. waters 1988-1993. Can. Data Rep. Fish. Aquat. Sci. 976: 129 p.

Wyeth, M.R. and A.R. Kronlund. 2003. Sablefish (*Anoplopoma fimbria*) research and assessment surveys conducted in British Columbia waters from 1996 through 2000. Can. Data Rep. Fish. Aquat. Sci. 1116: 130 p.

Wyeth, M.R., A.R. Kronlund, and M. Elfert. 2003. Summary of the 2001 British Columbia Sablefish (*Anoplopoma fimbria*) research and assessment survey. Can. Data Rep. Fish. Aquat. Sci. 1118: 54 p.

Wyeth, M.R., A.R. Kronlund, and M. Elfert. 2004a. Summary of the 2002 British Columbia Sablefish (*Anoplopoma fimbria*) research and assessment survey. Can. Data Rep. Fish. Aquat. Sci. 1140: 59 p.

Wyeth, M.R, A.R. Kronlund, and M. Elfert. 2004b. Summary of the 2003 British Columbia Sablefish (*Anoplopoma fimbria*) research and assessment survey. Can. Data Rep. Fish. Aquat. Sci. 1148: 68 p.

Table 1. Summary of sets conducted during the 2004 sablefish research and assessment survey. Biosampling codes correspond to length (L), sex (S), weight (W), maturity (M), and excision of otoliths (O) for ageing.

Survey component	Charter	Set type	Location	Depth	Traps/Set	Bait	Sablefish catch processing
Traditional	Standardized (Ocean Marauder)	Standardized	nine offshore indexing localities	7 depth intervals	25	1 kg squid	50 piece LS(W)MO biosample, 80-100 piece LSM biosample
	Standardized (Ocean Marauder)	Standardized	five mainland inlet localities	prevailing depth	25	1 kg squid	½ of traps used for tagging, ½ of traps used for biosample (50 piece LS(W)MO)
	Tagging (Milbanke Sound)	Type 1 (traditional) tagging	six offshore tagging localities	250-450 fm	~65	1 kg squid plus 4.5 kg hake	all tagged until 1000 fish released in each locality
	Tagging (Milbanke Sound)	Type 1 (traditional) tagging	nine offshore indexing localities	250-450 fm	~65	1 kg squid plus 4.5 kg hake	all tagged until 300 fish released in each locality
Stratified random sampling (StRS)	Tagging (Milbanke Sound)	Type 3 (random) tagging	five spatial strata	3 depth strata	25	1 kg squid plus 4.5 kg hake	1/3 of traps used for tagging, 1/3 of traps used for biosample (50 piece LS(W)MO), 1/3 of traps discarded

Table 2. British Columbia sablefish research and assessment surveys, 1988 to 2004.

Year	Vessel	Skipper	Dates	Sets	GFBio trip ID
1988	Vicious Fisher	Vance Fletcher	28 Oct - 24 Nov	16	43990
1989	La Porsche	Sigurd Brynjolfson	19 Oct - 18 Nov	29	43910
1990	Viking Star	Doug Farrington	08 Nov - 18 Nov	24	43750
1991	W. E. Ricker	Alan Farrington	09 Oct - 29 Oct	32	43673
1992	W. E. Ricker	Ron Roberts	13 Oct - 04 Nov	38	43670
1993	W. E. Ricker	Alan Farrington	19 Oct - 11 Nov	42	43650
1994	La Porsche	Richard Beauvais	13 Oct - 31 Oct	39	43630
	Western Viking	Rick Jones	18 Oct - 13 Nov	27	43390
1995	Viking Sunrise	Jason Olsen	01 Oct - 31 Oct	40	43350
	Ocean Pearl	Robert Fraumeni	08 Oct - 20 Oct	29	43270
	Victor F	Michael Derry	11 Oct - 28 Oct	34	43330
1996	Viking Sunrise	Albert Melnychuk	10 May - 30 May	42	43024
	Ocean Pearl	Michael Derry	26 Sep - 10 Oct	32	43039
	Viking Star	Otto Elvan	30 Sep - 22 Oct	49	43210
1997	Viking Sunrise	Albert Melnychuk	20 May - 10 Jun	42	42760
	Ocean Pearl	Michael Derry	26 Sep - 21 Oct	74	42699
1998	Ocean Pearl	Michael Derry	22 Sep - 17 Oct	89	41122
1999	Ocean Pearl	Michael Derry	29 Sep - 30 Oct	109	40589
2000	Pacific Viking	Albert Melnychuk	08 Oct - 14 Nov	131	40517
2001	Ocean Pearl	Michael Derry	06 Oct - 06 Nov	134	43233
2002	Pacific Viking	Albert Melnychuk	04 Oct - 07 Nov	125	48120
	Viking Sunrise	Jason Olsen	05 Oct - 13 Nov	90	48110
2003	Viking Star	Jim Farrington	07 Oct - 10 Nov	84	52120
	Ocean Pearl	Michael Derry	15 Oct - 13 Nov	94	52100
2004	Ocean Marauder	Albert Melnychuk	05 Oct - 03 Nov	84	57360
	Milbanke Sound	Don Quast	05 Oct - 15 Nov	95	58145

Table 3. Geographic boundaries of the traditional sablefish survey offshore localities.

	Latitude north		Longitude west	
Locality	**Maximum**	**Minimum**	**Maximum**	**Minimum**
Offshore indexing				
Langara Island-North Frederick	54°09′	53°59′	134°2′	133°32′
Hippa Island	53°32′	53°20′	133°24′	132°55′
Buck Point	53°14′	53°01′	133°10′	132°35′
Gowgaia Bay	52°27′	52°17′	131°51′	131°33′
Cape St. James [1]	51°50′	51°37′	130°59′	130°19′
Triangle Island	51°08′	50°58′	129°55′	129°31′
Quatsino Sound	50°25′	50°12′	128°38′	128°08′
Esperanza Inlet	49°47′	49°24′	127°39′	127°13′
Barkley Canyon	48°24′	48°10′	126°12′	125°53′
Offshore tagging				
Rennell Sound	53°33′	53°14′	133°17′	132°55′
Tasu Sound	52°49′	52°34′	132°16′	131°58′
Middle Ground	51°20′	51°09′	130°9′	129°57′
Pisces Canyon	50°37′	50°29′	128°47′	128°34′
Estevan Point	49°16′	48°59′	127°10′	126°53′
Father Charles Canyon	48°29′	48°46′	126°35′	126°09′

[1] The South Moresby Rockfish Protected Area (RPA) overlaps slightly with the Cape St. James survey locality so sets were not made in the Northwest corner of the locality. The South Moresby RPA is described as:, McLean-Fraser Point to Grey Rock: Sub-areas 2-31 to 2-37 and those portions of Sub-areas 102-3, 130-3 and 142-1 that are inside of a line that begins at 52 deg 12 min north and 131 deg 25 min west, then south-westerly to 52 deg 11 min north and 131 deg 30 min west, then south-easterly to 51 deg 49 min north and 130 deg 57 min west, then northerly to 51 deg 54 min north and 130 deg 54 min west, then north-easterly to 51 deg 59 min north and 131 deg west.

Table 4. Geographic boundaries of the set locations within each mainland inlet locality. Each set location was defined as the area enclosed by the polygon with vertices at each of the four or five indicated points.

		Point 1		Point 2		Point 3		Point 4		Point 5	
		Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude	Latitude	Longitude
Locality	Location	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
Portland Inlet	1	54 51.90	130 14.70	54 54.75	130 11.43	54 53.53	130 07.50	54 50.51	130 10.45		
	2	54 46.57	130 15.18	54 48.70	130 19.46	54 49.97	130 16.82	54 48.14	130 12.85		
	3	54 44.25	130 21.31	54 46.29	130 24.31	54 47.83	130 21.43	54 45.24	130 17.90		
	4	54 43.52	130 22.73	54 40.21	130 23.55	54 42.28	130 28.61	54 45.42	130 26.19		
	5	54 39.31	130 26.42	54 37.27	130 30.74	54 39.29	130 35.00	54 41.80	130 30.17		
Gil Island	1	53 18.05	129 16.39	53 18.44	129 19.88	53 21.43	129 19.95	53 19.66	129 16.42		
	2	53 09.54	129 20.71	53 09.91	129 25.97	53 12.99	129 24.20	53 12.98	129 19.84		
	3	53 06.18	129 18.06	53 04.06	129 21.26	53 07.44	129 24.93	53 08.68	129 20.47		
	4	53 07.25	129 05.11	53 05.89	129 05.03	53 05.84	129 09.03	53 07.42	129 08.51		
	5	53 11.48	129 05.23	53 09.64	129 05.11	53 09.87	129 09.73	53 12.37	129 08.86		
Finlayson Channel	1	52 45.95	128 26.18	52 46.80	128 27.62	52 48.50	128 27.06	52 47.76	128 24.27		
	2	52 44.04	128 26.51	52 41.68	128 25.75	52 42.06	128 28.50	52 44.40	128 28.94		
	3	52 40.09	128 26.28	52 38.70	128 26.49	52 38.58	128 30.19	52 40.92	128 29.26		
	4	52 34.94	128 26.40	52 33.73	128 25.99	52 33.77	128 29.28	52 35.14	128 29.82		
	5	52 30.05	128 25.23	52 29.61	128 28.35	52 31.58	128 29.35	52 31.45	128 26.22		
Dean/ Burke Channel	1	52 21.75	127 26.49	52 19.95	127 27.44	52 20.03	127 30.27	52 21.89	127 28.77		
	2	52 27.03	127 14.35	52 25.39	127 14.18	52 26.38	127 16.35	52 27.22	127 17.64	52 27.83	127 16.18
	3	52 16.38	127 13.24	52 15.01	127 16.01	52 16.27	127 17.70	52 17.50	127 15.34		
	4	52 13.00	127 27.24	52 14.71	127 24.89	52 13.36	127 22.83	52 11.53	127 25.11		
	5	52 07.46	127 34.67	52 06.33	127 36.72	52 07.44	127 38.90	52 08.74	127 35.60		

Table 5. Localities visited during sablefish research and assessment surveys from 1994 through 2004 showing the number of standardized (S) and tagging (T) sets completed at each locality. For simplicity, surveys conducted prior to 1994 and the spring tagging surveys conducted in 1996 and 1997 are not shown (for details on these surveys, see Wyeth and Kronlund 2003). Localities that are no longer visited are shown in *italics*.

Year		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004	
Set type		S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T
Locality																							
Offshore indexing	Langara Island-North	5	-	5	-	5	-	5	-	5	-	6	1	8	1	5	1	7	7	7	1	7	1
	Frederick																						
	Louis Point-Frederick	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*3*	-	-	-	-	-	-	-
	Island																						
	Kunakun Point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*3*	-	-	-	-	-	-	-
	Hippa Island	5	-	5	-	5	-	-	-	5	-	6	1	8	1	5	1	21	12	7	1	7	1
	Buck Point	5	-	5	-	5	-	5	-	5	-	6	1	5	1	5	1	7	7	7	1	7	1
	Tasu Sound-Marble Island	-	-	-	-	-	-	-	-	-	-	-	-	*6*	-	*6*	-	-	-	-	-	-	-
	Gowgaia Bay	5	-	5	5	5	-	5	-	5	-	6	1	8	1	8	1	21	7	7	1	7	1
	Flamingo Inlet	-	-	-	-	-	-	-	-	-	-	-	-	*3*	-	*3*	-	-	-	-	-	-	-
	Cape St. James	5	-	5	-	5	-	5	-	5	-	5	1	5	1	5	1	7	7	7	1	7	1
	Triangle Island	5	-	5	-	5	-	5	-	5	-	5	1	5	1	5	1	7	7	7	2	7	1
	Quatsino Sound	5	-	5	-	5	-	5	-	5	-	5	1	8	1	8	1	7	7	7	1	7	1
	Solander Island	*5*	-	*5*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Esperanza Inlet	5	-	5	-	5	-	5	-	5	-	5	1	8	1	8	1	21	7	7	1	7	1
	Barkley Canyon	5	-	5	-	5	-	5	-	5	-	5	1	8	1	8	1	7	12	8	1	8	1
	Total	**50**	**-**	**50**	**5**	**45**	**-**	**40**	**-**	**45**	**-**	**49**	**9**	**72**	**9**	**72**	**9**	**105**	**73**	**64**	**10**	**64**	**9**
Mainland inlet	Portland Inlet	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-
	Gil Island	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-
	Finlayson Channel	-	1	3	-	4	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-
	Mathieson Channel	-	*1*	-	-	*1*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dean/Burke Channel	-	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-	5	-
	Total	**10**	**2**	**18**	**-**	**20**	**-**	**20**	**-**	**20**	**-**	**20**	**-**	**20**	**-**	**20**	**-**	**20**	**-**	**20**	**-**	**20**	**-**

Year		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004	
Set type		S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T
Locality																							
Offshore tagging	*Frederick Island*	-	-	-	*10*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Hogback	-	-	-	-	-	-	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Rennell Sound	-	-	-	-	-	2	-	2	-	-	-	8	-	5	-	4	-	2	-	2	-	1
	Chads Point	-	-	-	*5*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tasu Sound	-	-	-	-	-	2	-	2	-	5	-	5	-	3	-	4	-	3	-	1	-	2
	Anthony Island	-	-	-	*3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mitchell's Gully/Middle Ground	-	-	-	3	-	3	-	2	-	4	-	3	-	4	-	4	-	3	-	1	-	2
	Pisces Canyon	-	-	-	2	-	3	-	2	-	4	-	6	-	4	-	4	-	3	-	2	-	2
	Kyuquot Sound-Ouokinish Inlet	-	-	-	-	-	-	-	-	-	*4*	-	-	-	-	-	-	-	-	-	-	-	-
	Estevan Point	-	-	-	2	-	3	-	2	-	4	-	4	-	4	-	4	-	3	-	1	-	2
	Father Charles Canyon	-	-	-	2	-	3	-	2	-	3	-	4	-	4	-	4	-	3	-	2	-	2
	Total	**-**	**-**	**-**	**27**	**-**	**16**	**-**	**14**	**-**	**24**	**-**	**30**	**-**	**24**	**-**	**24**	**-**	**17**	**-**	**9**	**-**	**11**
Grand total		**60**	**2**	**68**	**22**	**65**	**16**	**60**	**14**	**65**	**24**	**69**	**37**	**92**	**33**	**92**	**33**	**125**	**90**	**84**	**19**	**84**	**20**

Table 6. Sablefish research and assessment survey depth intervals.

Depth interval	Minimum depth m (fm)	Maximum depth m (fm)
Offshore standardized		
D0	91 (50)	274 (149)
D1	274 (150)	457 (249)
D2	457 (250)	641 (349)
D3	641 (350)	824 (449)
D4	824 (450)	1006 (549)
D5	1006 (550)	1189 (649)
D6	1189 (650)	1372 (749)
D7	1372 (750)	1827 (999)
Type 1 tagging		
	457 (250)	824 (450)
Type 3 tagging		
RD_1	183 (100)	457 (250)
RD_2	457 (250)	824 (450)
RD_3	824 (450)	1372 (750)
Mainland inlet standardized		
	prevailing depth at set locations	

Table 7. Summary of the stratified random sampling survey strata. The area (km^2) of each spatial (S_i) and depth (RD_j) stratum combination is indicated, with the number of possible 2 km by 2 km sampling units per stratum in parentheses ().

Stratum	RD_1 183-457 m (100-250 fm)	RD_2 457-824 m (250-450 fm)	RD_3 824-1372 m (450-750 fm)	All depths
S_1	1,088 (272)	1,236 (309)	2,024 (506)	**4,348 (1,087)**
S_2	976 (244)	1,252 (313)	2,236 (559)	**4,464 (1,116)**
S_3	3,628 (907)	1,240 (310)	1,372 (343)	**6,240 (1,560)**
S_4	456 (114)	496 (124)	1,384 (346)	**2,336 (584)**
S_5	1,508 (377)	1,020 (255)	1,672 (418)	**4,200 (1,050)**
All areas	**7,656 (1,914)**	**5,244 (1,311)**	**8,688 (2,172)**	**21,588 (5,397)**

Table 8. Summary of species captured during the 2004 survey standardized sets conducted at offshore indexing localities. No value in the count or weight columns indicates that the catch was not counted or weighed, respectively. Trace indicates a total weight of less than 1 kg.

Common name	Scientific name	Total count	Total weight (kg)
Round fish			
Sablefish	*Anoplopoma fimbria*	11,028	32,002
Pacific Grenadier	*Coryphaenoides acrolepis*	334	299
Giant Grenadier	*Albatrossia pectoralis*	170	651
Lingcod	*Ophiodon elongatus*	76	684
Pacific Flatnose	*Antimora microlepis*	18	9
Pacific Cod	*Gadus macrocephalus*	12	32
Snailfishes	Liparinae	10	5
Spiny Dogfish	*Squalus acanthias*	3	11
Pacific Viperfish	*Chauliodus macouni*	2	
Brown Cat Shark	*Apristurus brunneus*	1	trace
Bigmouth Sculpin	*Hemitripterus bolini*	1	6
Rockfish			
Unidentified Rockfish	Sebastinae	3	1
Rougheye Rockfish	*Sebastes aleutianus*	370	601
Redbanded Rockfish	*Sebastes babcocki*	51	79
Shortspine Thornyhead	*Sebastolobus alascanus*	20	20
Shortraker Rockfish	*Sebastes borealis*	11	32
Longspine Thornyhead	*Sebastolobus altivelis*	7	2
Pacific Ocean Perch	*Sebastes alutus*	5	6
Rosethorn Rockfish	*Sebastes helvomaculatus*	3	3
Yelloweye Rockfish	*Sebastes ruberrimus*	2	3
Sharpchin Rockfish	*Sebastes zacentrus*	1	trace
Flatfish			
Arrowtooth Flounder	*Atheresthes stomias*	480	1,066
Pacific Halibut	*Hippoglossus stenolepis*	42	324
Dover Sole	*Microstomus pacificus*	12	15
Slender Sole	*Lyopsetta exilis*	1	trace
Invertebrates			
Sea Urchins	Echinacea	73	3
Heart Urchins	Atelostomata	4	
Jellyfish	Scyphozoa	3	3
Anemone	Actiniaria	3	2
Starfish	Asteriodea	13	1
Fish-eating Star	*Stylasterias forreri*	7	
Gastropods	Gastropoda	45	
Sea Cucumber	Holothuroidea	5	
Sea Whip	*Osteocella septentrionalis*	2	
Prawn	Pandalus platyceros	1	
Sea Pens	Pennatulacea	1	
Brittle Stars	Phrynophiurida		trace
Sponges	Porifera	1	

Common name	Scientific name	Total count	Total weight (kg)
Basket Stars	Euryalae	1	
Octopus	Octopoda	2	3
Unidentified Crabs	Bracyura	4	trace
Brown King Crab	*Paralithodes brevipes*	1	trace
Queen Crabs	Lithodes	2	1
Red Queen Crab	*Lithodes couesi*	65	16
Paralomis multispina	*Paralomis multispina*	9	5
Grooved Tanner Crab	*Chionoecetes tanneri*	46	17
Box Crabs	Lopholithodes	5	2

Table 9. Summary of species captured during the 2004 survey standardized sets conducted at mainland inlet localities. No value in the count or weight columns indicates that the catch was not counted or weighed, respectively.

Common name	Scientific name	Total count	Total weight (kg)
Round fish			
Sablefish	*Anoplopoma fimbria*	9,933	24,197
Spiny Dogfish	*Squalus acanthias*	6	14
Pacific Sleeper Shark	*Somniosus pacificus*	6	501
Rockfish			
Shortspine Thornyhead	*Sebastolobus alascanus*	3	8
Rougheye Rockfish	*Sebastes aleutianus*	2	4
Yelloweye Rockfish	*Sebastes ruberrimus*	1	8
Flatfish			
Pacific Halibut	*Hippoglossus stenolepis*	63	539
Arrowtooth Flounder	*Atheresthes stomias*	14	22
Invertebrates			
Heart Urchins	Atelostomata	5	
Gastropods	Gastropoda	2	
Octopus	Octopoda	1	3
Grooved Tanner Crab	*Chionoecetes tanneri*	3	1

Table 10. Summary of species captured during the 2004 survey Type 1 tagging sets conducted at offshore indexing and offshore tagging localities. No value in the count or weight columns indicates that the catch was not counted or weighed, respectively. Trace indicates a total weight of less than 1 kg.

Common name	Scientific name	Total count	Total weight (kg)
Round fish			
Sablefish	*Anoplopoma fimbria*	18,153	49,986
Giant Grenadier	*Albatrossia pectoralis*	5	11
Hagfishes	Myxinidae	2	trace
Pacific Grenadier	*Coryphaenoides acrolepis*	2	6
Grenadiers	Macrouridae	1	3
Rockfish			
Rougheye Rockfish	*Sebastes aleutianus*	201	346
Shortraker Rockfish	*Sebastes borealis*	24	72
Shortspine Thornyhead	*Sebastolobus alascanus*	16	27
Longspine Thornyhead	*Sebastolobus altivelis*	2	1
Flatfish			
Arrowtooth Flounder	*Atheresthes stomias*	135	294
Pacific Halibut	*Hippoglossus stenolepis*	7	47
Dover Sole	*Microstomus pacificus*	6	7
Invertebrates			
Anemone	Actiniaria	2	1
Starfish	Asteriodea	1	trace
Sponges	Porifera	1	1
Octopus	Octopoda	1	2
Golden King Crab	*Lithodes aequispina*	1	trace
Red Queen Crab	*Lithodes couesi*	2	1
Tanner Crabs	*Chionoecetes* sp.	25	20

Table 11. Summary of species captured during the 2004 survey Type 3 tagging sets (StRS survey). No value in the count or weight columns indicates that the catch was not counted or weighed, respectively. Trace indicates a total weight of less than 1 kg.

Common name	Scientific name	Total count	Total weight (kg)
Round fish			
Sablefish	*Anoplopoma fimbria*	16,348	46,772
Pacific Grenadier	*Coryphaenoides acrolepis*	644	627
Spiny Dogfish	*Squalus acanthias*	532	1,226
Giant Grenadier	*Albatrossia pectoralis*	132	575
Lingcod	*Ophiodon elongatus*	76	748
Pacific Flatnose	*Antimora microlepis*	34	26
Pacific Cod	*Gadus macrocephalus*	17	51
Snailfishes	Liparinae	5	3
Spotted Ratfish	*Hydrolagus colliei*	2	trace
Eelpouts	Zoarcidae	1	1
Rockfish			
Rougheye Rockfish	*Sebastes aleutianus*	398	707
Redbanded Rockfish	*Sebastes babcocki*	101	172
Yelloweye Rockfish	*Sebastes ruberrimus*	41	123
Shortspine Thornyhead	*Sebastolobus alascanus*	28	49
Rosethorn Rockfish	*Sebastes helvomaculatus*	8	2
Longspine Thornyhead	*Sebastolobus altivelis*	8	2
Shortraker Rockfish	*Sebastes borealis*	2	8
Pacific Ocean Perch	*Sebastes alutus*	1	1
Silvergray Rockfish	*Sebastes brevispinis*	1	3
Yellowtail Rockfish	*Sebastes flavidus*	1	1
Flatfish			
Arrowtooth Flounder	*Atheresthes stomias*	665	1,644
Pacific Halibut	*Hippoglossus stenolepis*	71	684
Dover Sole	*Microstomus pacificus*	7	10
Petrale Sole	*Eopsetta jordani*	3	6
Invertebrates			
Sea Urchins	Echinacea	312	20
Starfish	Asteriodea	29	6
Anemone	Actiniaria	1	1
Jellyfish	Scyphozoa	3	4
Coelenterates	Cnidaria	1	1
Sponges	Porifera	3	4
Gastropods	Gastropoda	73	4
Vampire Squid	Vampyromorpha	2	2
Octopus	Octopoda	2	2
Seaslugs	Nudibranchiata	1	trace
Box Crabs	Lopholithodes	4	2
Tanner Crabs	*Chionoecetes* sp.	241	88
Paralomis multispina	*Paralomis multispina*	1	trace
Red Queen Crab	*Lithodes couesi*	64	39

Table 12. Summary of the number of sablefish recovered, tagged, and sampled during the traditional component of the 2004 survey.

		Number of sablefish		Number of sablefish sampled by attribute					
	Locality	Tagged	Recovered	Fork length	Sex	Maturity	Otoliths	Weight	Total
Offshore Indexing	Langara Island-N. Frederick	309	2	485	485	485	219	150	796
	Hippa Island	742	5	702	702	702	280	0	1,449
	Buck Point	298	3	601	601	601	283	265	902
	Gowgaia Bay	300	6	588	588	588	294	200	894
	Cape St. James	309	19	612	612	612	267	208	940
	Triangle Island	319	15	697	697	697	339	20	1,031
	Quatsino Sound	317	4	601	601	601	268	205	922
	Esperanza Inlet	333	5	679	679	679	247	89	1,017
	Barkley Canyon	297	15	951	946	951	203	0	1,263
	Total	**3,224**	**74**	**5,916**	**5,911**	**5,916**	**2,400**	**1,137**	**9,214**
Offshore Tagging	Rennell Sound	559	1	0	0	0	0	0	560
	Tasu Sound	989	5	0	0	0	0	0	994
	Middle Ground	1,044	36	0	0	0	0	0	1,080
	Pisces Canyon	793	6	0	0	0	0	0	799
	Estevan Point	994	23	0	0	0	0	0	1,017
	Father Charles Canyon	998	2	0	0	0	0	0	1,000
	Total	**5,377**	**73**	**0**	**0**	**0**	**0**	**0**	**5,450**
Mainland Inlet	Portland Inlet	1,400	4	255	255	255	255	245	1,659
	Gil Island	1,450	14	327	327	327	327	326	1,791
	Finlayson Channel	1,127	29	315	315	315	315	314	1,471
	Dean/Burke Channel	892	38	287	287	287	287	287	1,217
	Total	**4,869**	**85**	**1,184**	**1,184**	**1,184**	**1,184**	**1,172**	**6,138**
Traditional Survey Total		**13,470**	**232**	**7,100**	**7,095**	**7,100**	**3,584**	**2,309**	**20,802**

Table 13. Summary of sablefish recovered, tagged, and sampled during the stratified random design component of the 2004 survey.

Stratum		Number of sablefish		Number of sablefish sampled by attribute					
Spatial	Depth	Recovered	Tagged	Fork length	Sex	Maturity	Otolith	Weight	Total
S_1	RD_1	0	572	310	310	310	310	0	882
	RD_2	5	1,039	276	276	276	276	0	1,320
	RD_3	7	306	230	230	230	230	0	543
	All	**12**	**1,917**	**816**	**816**	**816**	**816**	**0**	**2,745**
S_2	RD_1	0	198	213	212	212	213	0	411
	RD_2	4	477	181	181	181	181	0	662
	RD_3	1	332	232	232	231	232	0	565
	All	**5**	**1,007**	**626**	**625**	**624**	**626**	**0**	**1,638**
S_3	RD_1	1	253	219	219	219	219	0	473
	RD_2	11	619	246	246	245	246	0	876
	RD_3	1	189	220	220	220	220	0	410
	All	**13**	**1,061**	**685**	**685**	**684**	**685**	**0**	**1,759**
S_4	RD_1	0	12	5	5	5	5	0	17
	RD_2	4	437	288	288	287	288	0	729
	RD_3	0	154	203	203	203	195	0	357
	All	**4**	**603**	**496**	**496**	**495**	**488**	**0**	**1,103**
S_5	RD_1	7	179	182	182	182	181	0	368
	RD_2	18	565	268	268	267	268	0	851
	RD_3	3	237	206	206	206	206	0	446
	All	**28**	**981**	**656**	**656**	**655**	**655**	**0**	**1,665**
All	**RD_1**	**8**	**1,214**	**929**	**928**	**928**	**928**	**0**	**2,151**
	RD_2	**42**	**3,137**	**1,259**	**1,259**	**1,256**	**1,259**	**0**	**4,438**
	RD_3	**12**	**1,218**	**1,091**	**1,091**	**1,090**	**1,083**	**0**	**2,321**
	All	**62**	**5,569**	**3,279**	**3,278**	**3,274**	**3,270**	**0**	**8,910**

Table 14. Summary of biological data collected during the 2004 traditional survey excluding recovered tagged fish.

Locality		Mean fork length (mm)				Proportion
		Males	Females	Sexes combined	Tagged	males
Offshore Indexing	Langara Island-North Frederick	607	687	657	629	0.38
	Hippa Island	599	677	650	617	0.35
	Buck Point	612	680	651	609	0.42
	Gowgaia Bay	616	665	649	653	0.34
	Cape St. James	604	665	641	631	0.38
	Triangle Island	582	657	617	605	0.53
	Quatsino Sound	590	651	629	605	0.36
	Esperanza Inlet	569	660	623	608	0.40
	Barkley Canyon	575	648	627	598	0.29
	Mean	**593**	**664**	**637**	**617**	**0.38**
Offshore Tagging	Rennell Sound	-	-	-	625	-
	Tasu Sound	-	-	-	653	-
	Middle Ground	-	-	-	565	-
	Pisces Canyon	-	-	-	622	-
	Estevan Point	-	-	-	590	-
	Father Charles Canyon	-	-	-	625	-
	Mean	**-**	**-**	**-**	**612**	**-**
Mainland Inlet	Portland Inlet	571	613	603	606	0.25
	Gil Island	583	633	615	613	0.36
	Finlayson Channel	552	609	590	590	0.33
	Dean/Burke Channel	536	584	570	571	0.30
	Mean	**561**	**610**	**595**	**598**	**0.32**

Table 15. Summary of biological data collected during the 2004 random survey excluding recovered tagged fish.

Stratum		Mean fork length (mm)				Proportion
Spatial	Depth	Males	Females	Sexes combined	Tagged	males
S_1	RD_1	564	649	628	608	0.24
	RD_2	588	658	620	603	0.55
	RD_3	574	659	631	610	0.33
	All	**578**	**654**	**626**	**606**	**0.37**
S_2	RD_1	613	675	653	646	0.34
	RD_2	601	665	635	623	0.48
	RD_3	619	657	641	646	0.40
	All	**611**	**666**	**643**	**635**	**0.40**
S_3	RD_1	600	654	630	626	0.45
	RD_2	588	666	613	605	0.68
	RD_3	593	698	646	619	0.49
	All	**593**	**673**	**629**	**613**	**0.55**
S_4	RD_1	770	672	691	670	0.20
	RD_2	604	665	631	627	0.54
	RD_3	643	685	666	656	0.47
	All	**620**	**674**	**646**	**635**	**0.51**
S_5	RD_1	612	673	648	642	0.41
	RD_2	579	664	609	600	0.64
	RD_3	601	680	633	626	0.60
	All	**593**	**672**	**627**	**614**	**0.56**
All	**RD_1**	**598**	**660**	**638**	**624**	**0.35**
	RD_2	**591**	**664**	**621**	**610**	**0.58**
	RD_3	**607**	**673**	**643**	**630**	**0.45**
	All	**597**	**666**	**633**	**617**	**0.47**

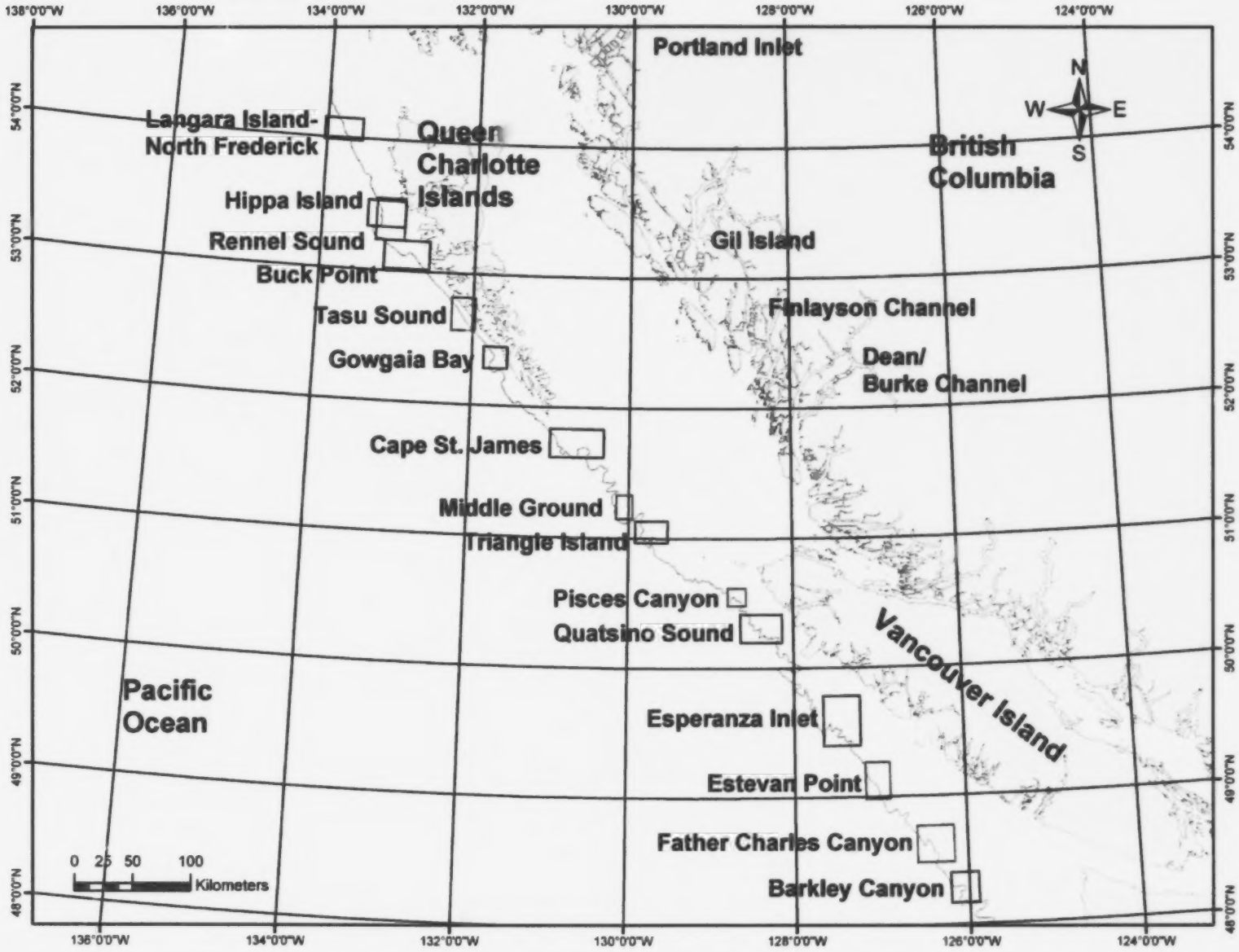


Figure 1. Geographic boundaries of the traditional survey localities. Blue boxes indicate an indexing locality, tagging localities are indicated by red boxes and green boxes indicate the locations within the mainland inlet localities. The 1000 m depth contour is shown.

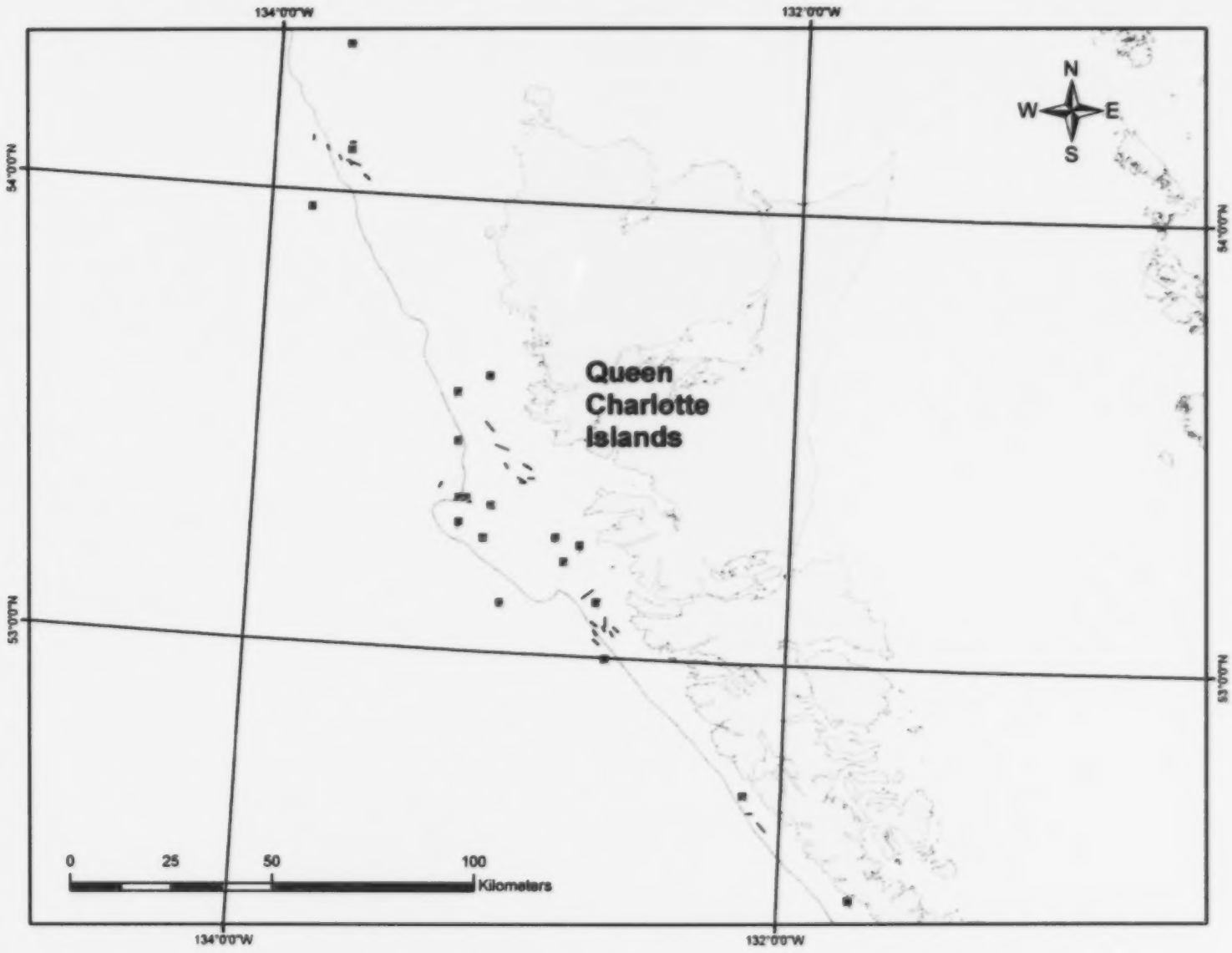


Figure 2. Locations of north coast sets completed during the 2004 survey. Blue lines represent standardized sets while red lines represent Type 1 tagging sets. Grey squares indicate the randomly selected 2 km by 2 km sampling units for the random design survey while the green lines represent the achieved locations of the Type 3 tagging (StRS) sets. The 1000 m contour is shown.

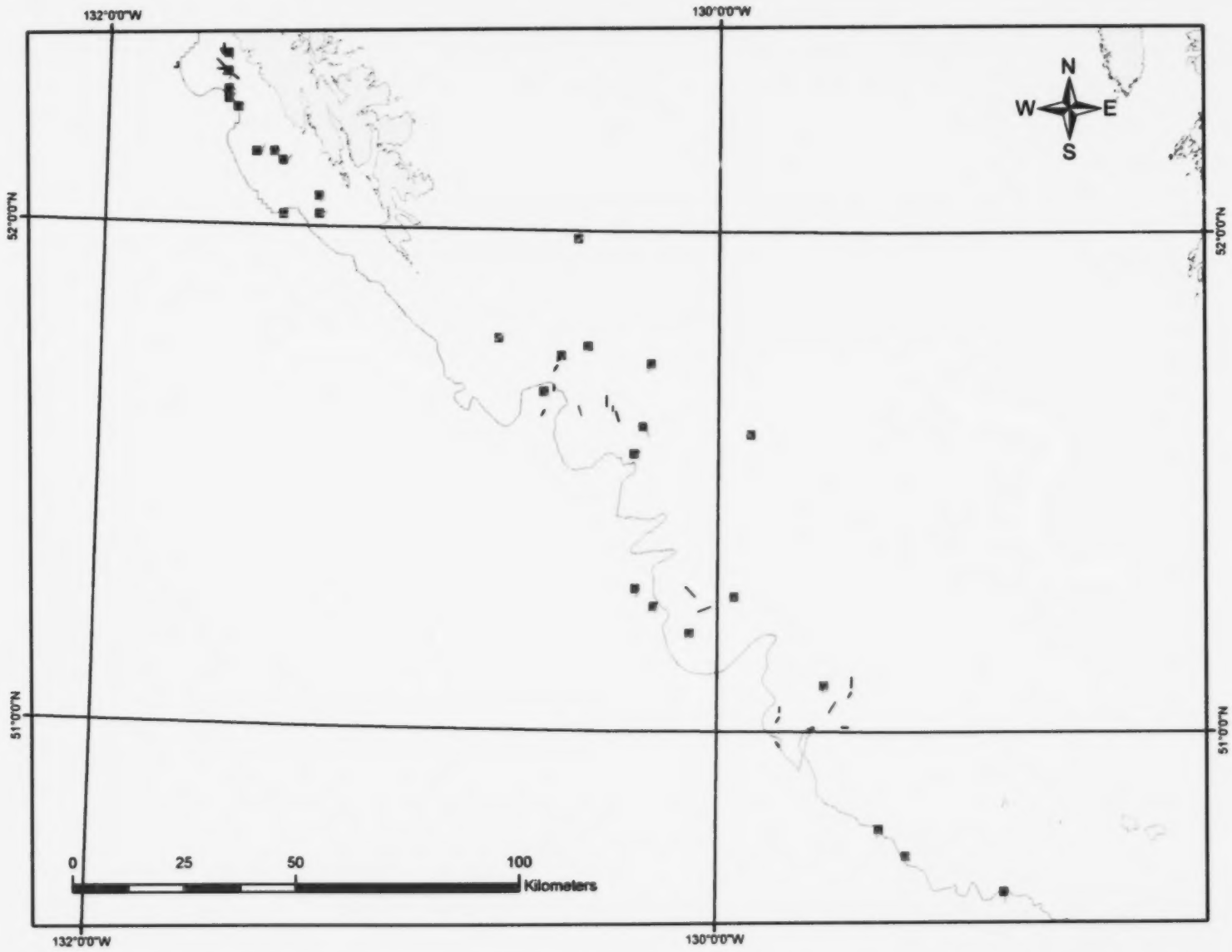


Figure 3. Locations of central coast sets completed during the 2004 survey. Blue lines represent standardized sets while red lines represent Type 1 tagging sets. Grey squares indicate the randomly selected 2 km by 2 km sampling units for the random design survey while the green lines represent the achieved locations of the Type 3 tagging (StRS) sets. The 1000 m contour is shown.

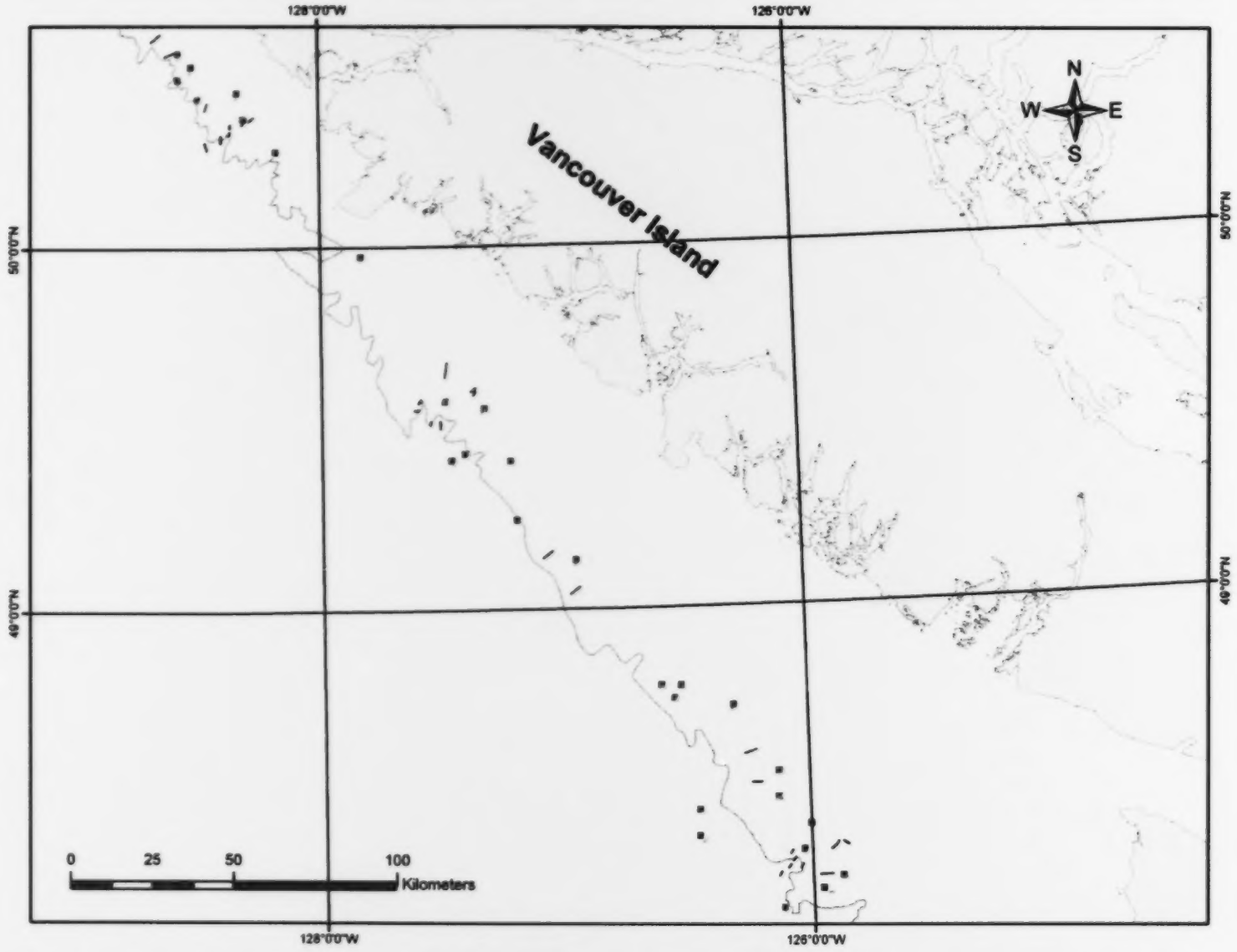


Figure 4. Locations of south coast sets completed during the 2004 survey. Blue lines represent standardized sets while red lines represent Type 1 tagging sets. Grey squares indicate the randomly selected 2 km by 2 km sampling units for the random design survey while the green lines represent the achieved locations of the Type 3 tagging (StRS) sets. The 1000 m contour is shown.

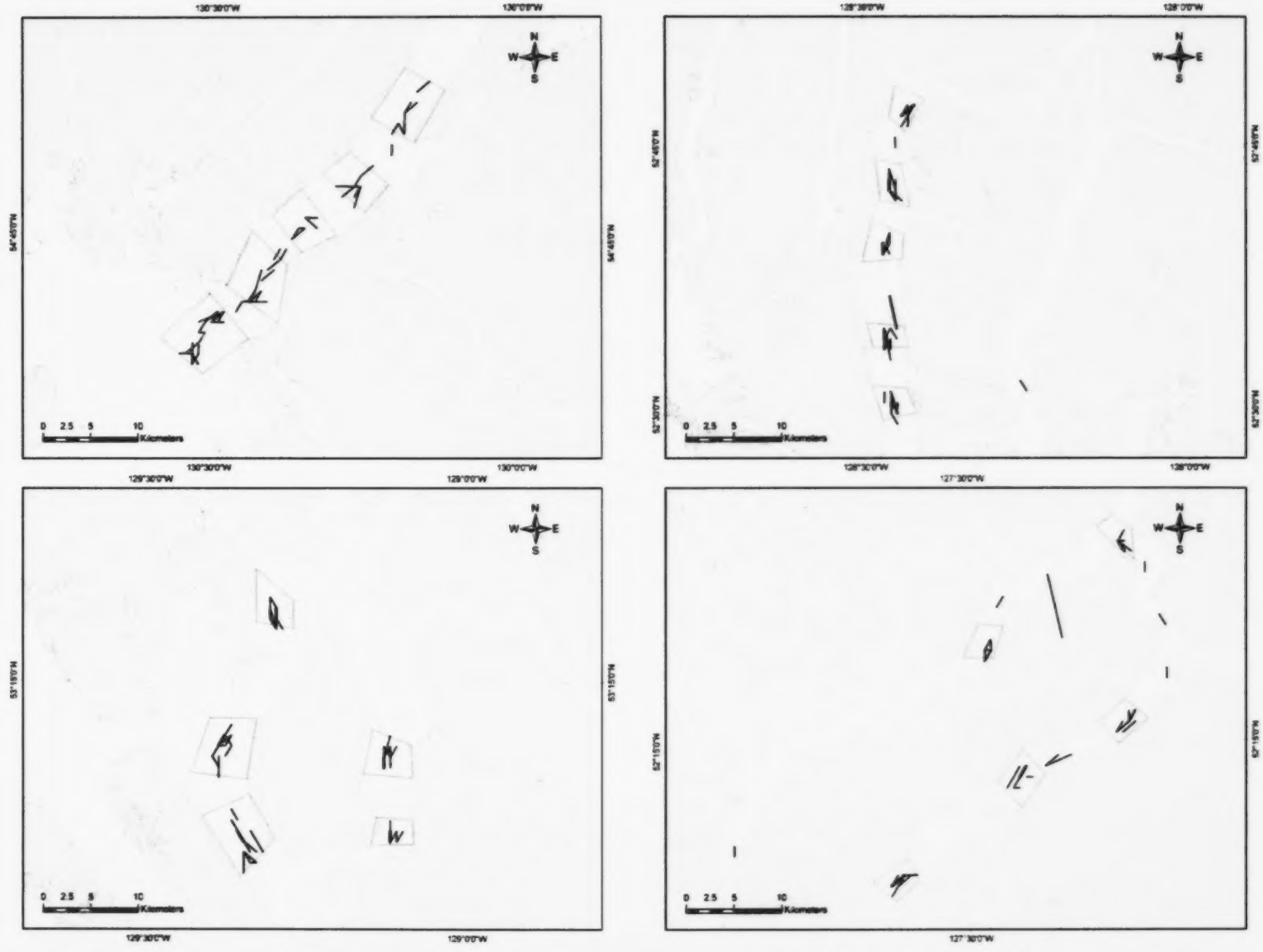


Figure 5. Sablefish survey mainland inlet localities. Figure panels show Portland Inlet (top left), Gil Island (bottom left), Finlayson Channel (top right) and Dean/Burke Channel (bottom right). Sets conducted from 1994 to 2003 are shown in black while the 2004 sets are shown in red. The green polygons indicate the five specific set locations within each of the four localities.

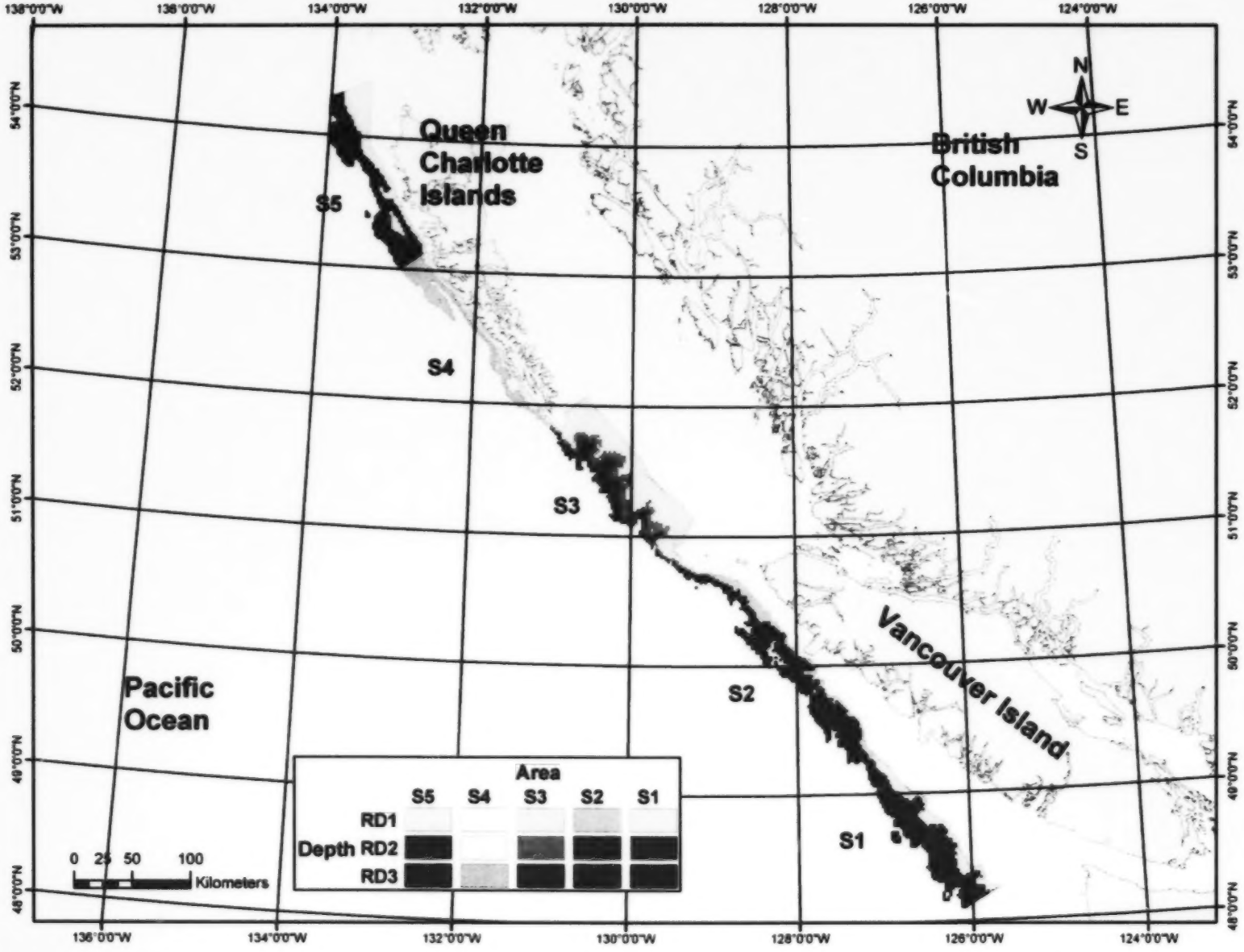


Figure 6. The stratified random sampling survey design. The boundaries of the 5 spatial strata (S_1-S_5) and the three depth strata (RD_1-RD_3) are shown.

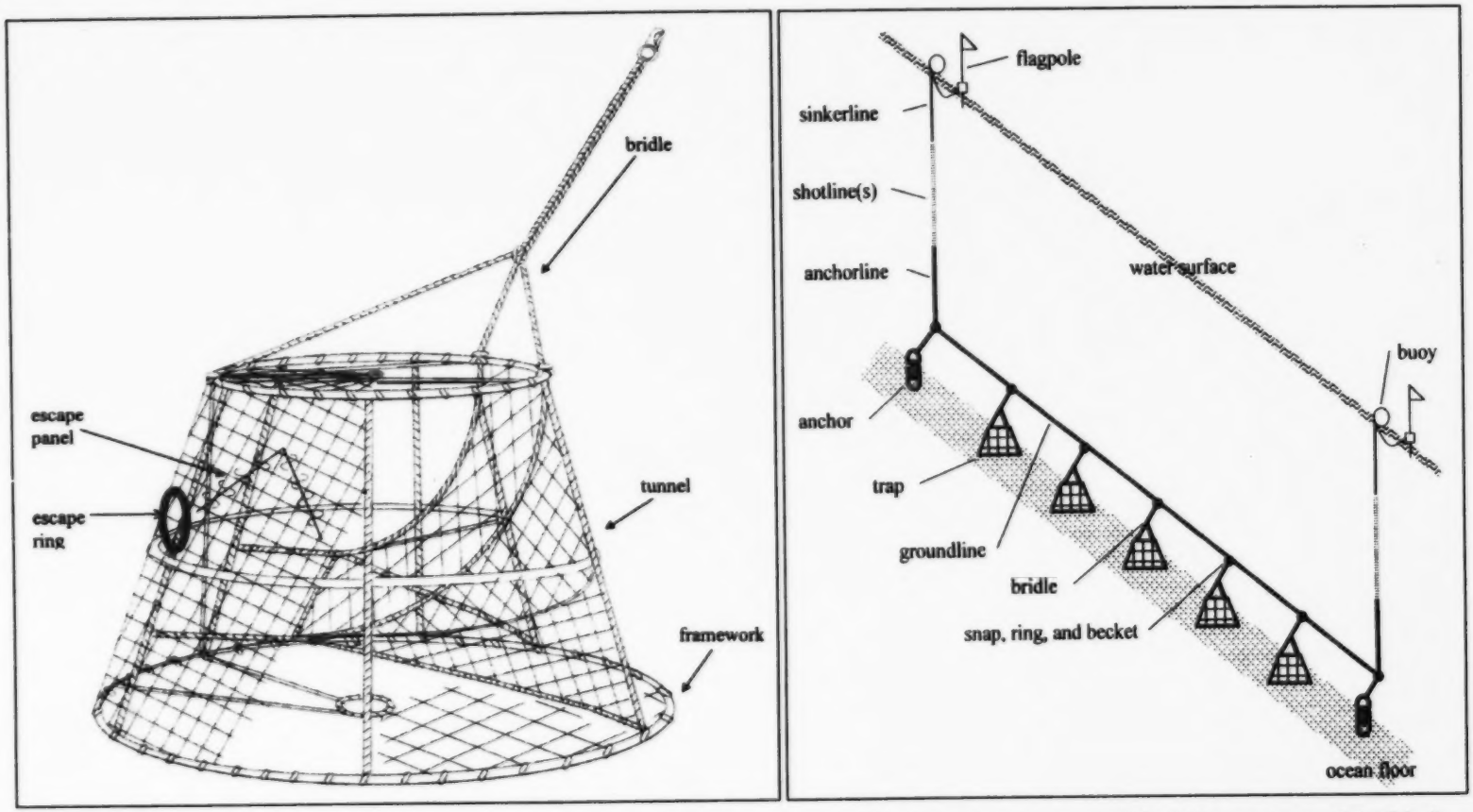


Figure 7. Diagrams of fishing gear used during the 2004 sablefish survey. The left panel shows a modified Korean trap of the kind used for survey fishing. The right panel shows a diagrammatic representation of the components of a set, or string, of trap gear.

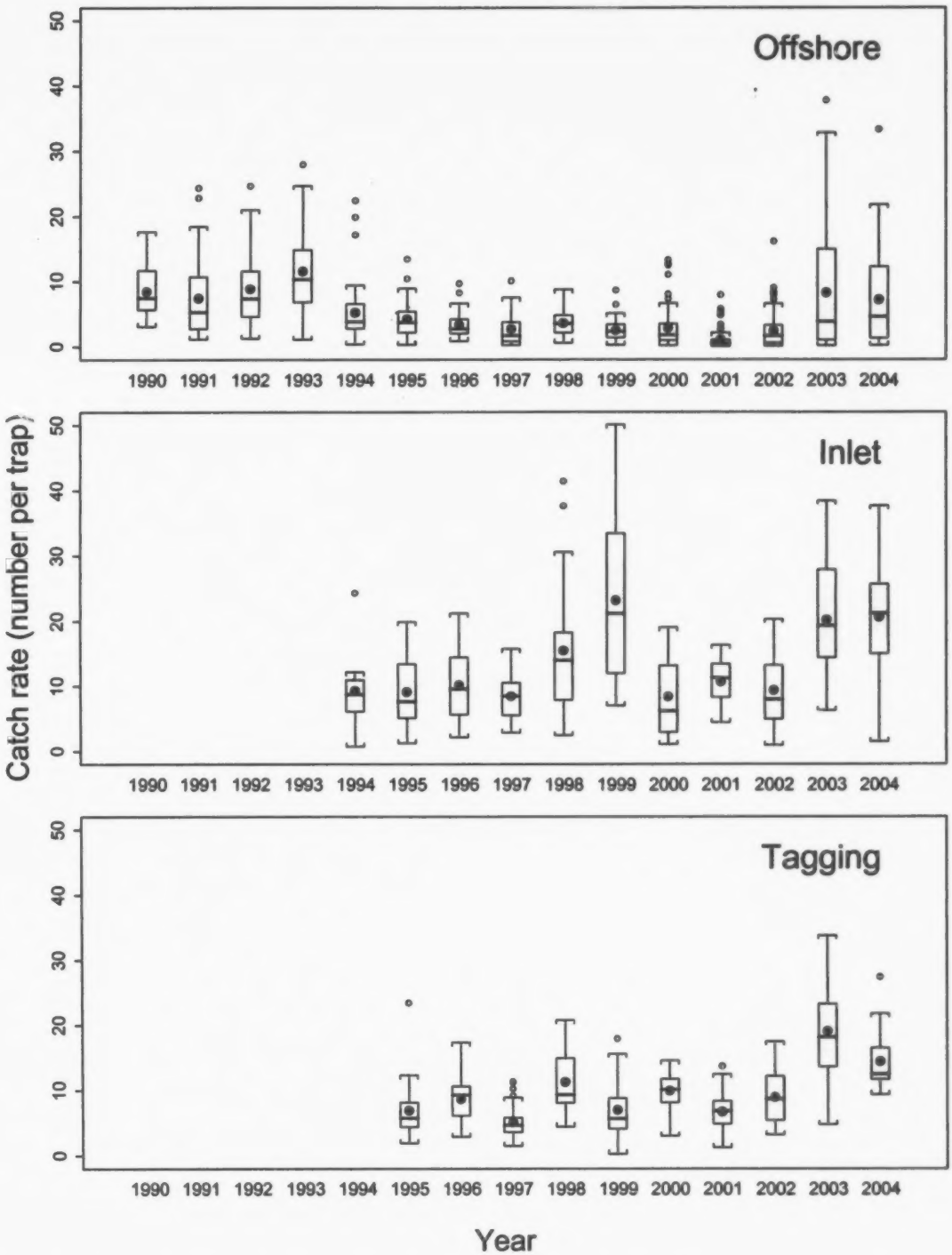


Figure 8. The annual distributions of catch rates (number of sablefish/number of traps) for standardized sets conducted at offshore indexing localities (Offshore), standardized sets conducted at mainland inlet localities (Inlet), and Type 1 tagging sets conducted at both offshore tagging localities and offshore indexing localities (Tagging) summarised by boxplots.

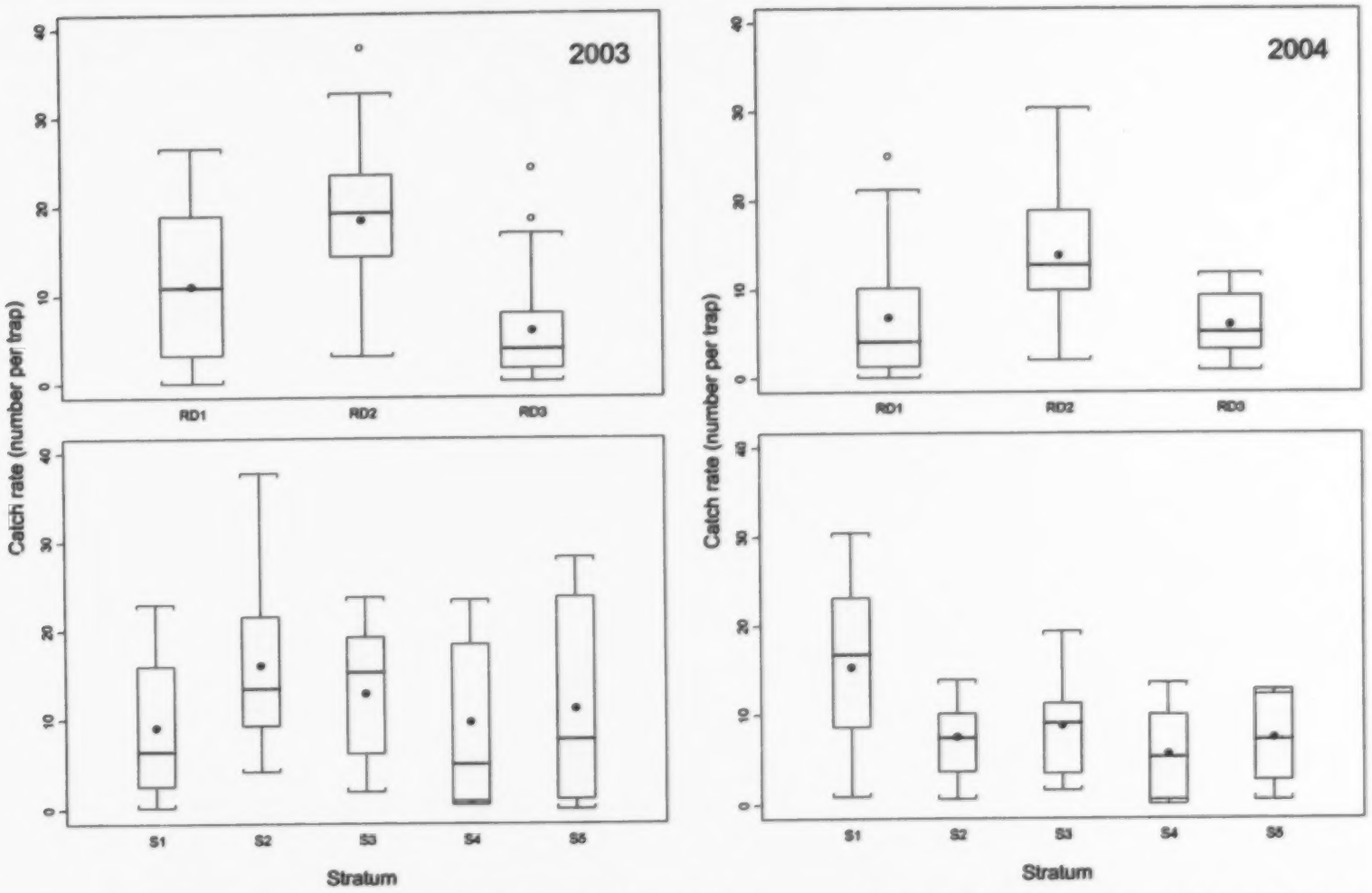


Figure 9. Distribution of catch rates for StRS survey (Type 3 tagging) sets summarised by a boxplot for each spatial (S_1-S_5) and depth (RD_1-RD_3) stratum. Results are shown for the 2003 (left panels) and 2004 (right panels) surveys. The filled circles show the mean stratum catch rates. The shaded rectangles indicate an approximate 95 percent confidence interval on the median stratum catch rate.

APPENDIX A DETAILS OF SETS COMPLETED DURING THE 2004 STANDARDIZED CHARTER (F/V OCEAN MARAUDER).

Sets are listed sequentially by the start date. The locality name, target depth interval, the start date and time as well as the duration in minutes are shown for each set. Position data include the Groundfish Major, Minor, and Locality area coding as well as the start and end latitude and longitude in degrees and decimal minutes. The bottom depth (m) at the start and end of the set are shown. The mean bottom depth is calculated from recordings at one minute intervals between the start and end of the set. The number of traps fished is also shown and excludes only open traps, while holed or fouled traps are included. All sets were baited with approximately one kilogram of frozen squid in a bait bag in each trap.

		Target			Duration		Start		End		Bottom depth (m)			Traps
Locality	Set	depth	Date	Time	(min)	Area code	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	fished
Barkley Canyon	1	D0	06-Oct	0623	1205	03-23-10	48 20.3	125 51.4	48 20.8	125 52.3	174	208	194	25
	2	D1	06-Oct	0704	1307	03-23-10	48 20.6	125 53.4	48 20.1	125 54.2	280	411	305	24
	3	D2	06-Oct	0752	1329	03-23-10	48 19.8	125 54.5	48 19.7	125 55.5	468	519	481	24
	4	D3	06-Oct	0911	1427	03-23-10	48 19.7	126 05.3	48 19.0	126 05.6	631	843	695	25
	5	D4	06-Oct	0943	1469	03-23-10	48 18.3	126 04.7	48 17.7	126 05.2	847	995	942	25
	6	D5	06-Oct	1026	1511	03-23-10	48 17.0	126 02.8	48 16.4	126 03.5	1041	1152	1106	25
	7	D6	06-Oct	1103	1554	03-23-10	48 16.8	126 05.6	48 16.3	126 06.2	1178	1297	1223	25
	8	D7	06-Oct	1139	1624	03-23-	48 15.7	126 07.8	48 15.1	126 08.6	1394	1437	1410	25
Esperanza Inlet	9	D6	08-Oct	1207	1294	04-25-4	49 31.2	127 30.2	49 30.5	127 30.6	1214	1317	1253	25
	10	D5	08-Oct	1253	1325	04-25-4	49 31.4	127 32.5	49 30.7	127 32.7	1013	1092	1077	25
	11	D4	08-Oct	1357	1337	04-26-8	49 33.3	127 36.9	49 33.5	127 35.6	816	750	881	25
	12	D3	08-Oct	1440	1381	04-26-8	49 35.3	127 35.3	49 34.5	127 35.7	653	646	742	24
	13	D2	08-Oct	1621	1404	04-25-3	49 36.4	127 21.1	49 35.7	127 21.7	450	534	505	25
	14	D1	08-Oct	1659	1447	04-25-3	49 36.7	127 21.3	49 36.3	127 22.4	276	510	395	24
	15	D0	08-Oct	1732	1495	04-25-3	49 37.0	127 21.3	49 37.0	127 21.3	177	188	185	23
Quatsino Sound	16	D0	10-Oct	0737	1420	04-27-3	50 21.3	128 18.0	50 22.0	128 17.1	274	188	241	24
	17	D1	10-Oct	0815	1442	04-27-3	50 22.0	128 19.1	50 21.4	128 19.5	316	439	417	24
	18	D2	10-Oct	0857	1481	04-27-3	50 21.1	128 19.7	50 20.6	128 20.4	530	494	518	25
	19	D3	10-Oct	0940	1511	04-27-3	50 20.5	128 22.9	50 19.9	128 23.0	664	680	748	25
	20	D4	10-Oct	1027	1540	04-27-6	50 19.5	128 22.9	50 19.0	128 23.7	827	876	900	25
	21	D5	10-Oct	1108	1575	04-27-6	50 18.6	128 25.6	50 17.9	128 25.8	1009	1143	1052	25
	22	D6	10-Oct	1158	1640	04-27-6	50 17.4	128 29.5	50 16.7	128 29.2	1207	1202	1258	24
Triangle Island	23	D6	12-Oct	1210	1223	05-11-	50 59.2	129 49.1	50 58.7	129 48.5	1212	1306	1320	25
	24	D5	12-Oct	1303	1281	05-11-7	51 00.7	129 41.8	51 00.4	129 42.7	1008	1077	1081	25

Locality	Set	Target depth	Date	Time	Duration (min)	Area code	Start Latitude	Start Longitude	End Latitude	End Longitude	Bottom depth (m) Start	Bottom depth (m) End	Bottom depth (m) Mean	Traps fished
	25	D4	12-Oct	1405	1316	05-11-	51 03.2	129 48.6	51 02.7	129 48.6	874	841	845	25
	26	D3	12-Oct	1438	1341	05-11-	51 02.3	129 48.1	51 01.7	129 48.9	664	677	658	25
	27	D2	12-Oct	1601	1364	05-11-7	51 00.9	129 34.8	51 00.8	129 36.0	501	565	501	25
	28	D1	12-Oct	1658	1374	05-11-7	51 05.0	129 34.7	51 04.2	129 35.1	437	459	424	24
	29	D0	12-Oct	1742	1407	05-11-7	51 06.6	129 34.2	51 05.8	129 34.2	258	265	262	25
Cape St. James	30	D0	14-Oct	0759	1327	06-08-14	51 40.2	130 21.7	51 39.5	130 22.0	262	265	263	24
	31	D1	14-Oct	0827	1353	06-08-14	51 39.2	130 20.5	51 38.5	130 20.5	379	437	419	24
	32	D2	14-Oct	0856	1398	06-08-14	51 38.4	130 20.0	51 37.7	130 19.8	474	558	503	24
	33	D3	14-Oct	1046	1411	06-08-6	51 45.3	130 31.1	51 44.7	130 31.3	666	779	708	25
	34	D4	14-Oct	1119	1447	06-08-6	51 44.2	130 31.5	51 43.6	130 31.8	830	883	860	25
	35	D5	14-Oct	1153	1517	06-08-14	51 41.8	130 32.4	51 41.2	130 32.2	1011	1046	1037	23
	36	D6	14-Oct	1237	1591	06-08-15	51 38.6	130 33.9	51 37.9	130 34.2	1191	1234	1203	24
Gowgaia Bay	37	D6	16-Oct	0845	1315	09-34-	52 18.7	131 47.1	52 19.0	131 48.0	1202	1258	1245	25
	38	D5	16-Oct	0923	1340	09-34-3	52 19.0	131 46.9	52 19.7	131 47.1	1019	997	1052	25
	39	D4	16-Oct	1032	1361	09-34-3	52 18.2	131 37.1	52 18.3	131 38.3	817	871	850	25
	40	D3	16-Oct	1114	1381	09-34-3	52 19.0	131 36.8	52 19.0	131 39.0	657	808	691	25
	41	D2	16-Oct	1156	1459	09-34-3	52 18.0	131 35.2	52 18.4	131 36.0	470	527	545	25
	42	D1	16-Oct	1235	1530	09-34-3	52 20.5	131 38.2	52 21.1	131 38.9	384	377	408	22
	43	D0	16-Oct	1325	1543	09-34-3	52 20.9	131 38.1	52 21.9	131 37.9	236	234	234	25
Buck Point	44	D0	18-Oct	0756	1346	09-31-3	53 03.6	132 37.7	53 04.2	132 38.5	241	258	251	25
	45	D1	18-Oct	0830	1451	09-31-3	53 05.4	132 40.8	53 04.6	132 40.2	443	441	439	25
	46	D2	18-Oct	0919	1310	09-31-8	53 03.6	132 39.5	53 03.1	132 38.6	519	510	519	24
	47	D3	18-Oct	0955	1477	09-31-3	53 03.8	132 40.4	53 04.3	132 41.2	657	657	658	25
	48	D4	18-Oct	1024	1528	09-31-3	53 05.0	132 43.2	53 04.4	132 42.4	863	845	878	25
	49	D5	18-Oct	1057	1568	09-31-3	53 04.0	132 43.1	53 03.4	132 42.1	1020	1037	1020	25
	50	D6	18-Oct	1138	1610	09-31-8	53 02.9	132 42.7	53 02.3	132 41.6	1203	1218	1212	25
Hippa Island	51	D6	20-Oct	0649	1953	09-31-	53 22.8	133 18.4	53 22.0	133 18.9	1196	1191	1192	25
	52	D5	20-Oct	0735	1807	09-31-14	53 20.3	133 13.1	53 20.3	133 11.9	1028	1026	1024	25
	53	D4	20-Oct	0900	1598	09-31-1	53 25.7	133 04.3	53 25.1	133 03.7	834	827	865	25
	54	D2	20-Oct	0945	1480	09-31-1	53 23.2	132 60.0	53 23.2	133 01.0	638	684	552	25
	55	D1	20-Oct	1033	1238	09-31-1	53 23.5	132 58.0	53 23.8	132 59.3	426	419	413	25
	56	D3	20-Oct	1120	1326	09-31-1	53 23.0	132 59.9	53 23.7	133 01.2	657	658	655	25
	57	D0	20-Oct	1206	1221	09-31-1	53 24.8	132 58.7	53 25.4	133 00.1	230	245	249	25

Locality	Set	Target depth	Date	Time	Duration (min)	Area code	Start Latitude	Start Longitude	End Latitude	End Longitude	Bottom depth (m) Start	Bottom depth (m) End	Bottom depth (m) Mean	Traps fished
Langara Island-North Frederick	58	D6	23-Oct	0836	1224	09-35-	54 07.7	133 51.9	54 07.0	133 51.8	1192	1207	1216	25
	59	D5	23-Oct	0913	1295	09-35-6	54 06.5	133 48.6	54 05.8	133 48.4	1017	1028	1022	25
	60	D4	23-Oct	1009	1366	09-35-6	54 05.0	133 46.1	54 04.5	133 45.5	843	817	841	25
	61	D3	23-Oct	1052	1395	09-35-6	54 04.1	133 42.8	54 04.8	133 43.4	657	675	658	25
	62	D2	23-Oct	1135	1431	09-35-6	54 06.8	133 42.1	54 06.8	133 43.4	475	527	490	25
	63	D0	23-Oct	1304	1514	09-35-2	54 01.9	133 35.7	54 02.6	133 36.7	229	324	256	24
	64	D1	23-Oct	1346	1388	09-35-2	54 02.3	133 38.9	54 02.9	133 40.1	439	439	432	25
Portland Inlet	65		25-Oct	1141	1094	08-04-12	54 52.4	130 11.5	54 51.6	130 11.5	435	441	437	25
	66		25-Oct	1222	1132	08-04-12	54 48.3	130 15.7	54 47.6	130 16.5	497	497	497	25
	67		25-Oct	1259	1191	08-04-12	54 46.0	130 21.5	54 45.4	130 22.3	512	543	525	25
	68		25-Oct	1337	1282	08-04-12	54 42.5	130 25.9	54 41.8	130 26.5	539	582	576	25
	69		25-Oct	1416	1381	08-04-10	54 39.2	130 31.8	54 38.6	130 32.7	644	529	633	21
Gil Island	70		27-Oct	1307	993	07-06-6	53 19.4	129 18.6	53 18.7	129 18.4	538	541	539	24
	71		27-Oct	1411	1062	07-06-6	53 12.2	129 22.9	53 11.5	129 23.8	563	529	532	24
	72		27-Oct	1502	1133	07-06-6	53 06.9	129 21.9	53 06.3	129 21.2	655	593	666	25
	73		27-Oct	1638	1172	07-06-6	53 06.5	129 07.5	53 07.1	129 07.2	567	550	567	24
	74		27-Oct	1725	1223	07-06-6	53 10.7	129 07.9	53 11.4	129 08.2	569	560	567	25
Finlayson Channel	75		29-Oct	1330	951	07-07-3	52 47.4	128 25.7	52 46.8	128 26.4	565	604	582	25
	76		29-Oct	1419	977	07-07-3	52 43.8	128 27.8	52 43.0	128 27.6	583	571	598	22
	77		29-Oct	1455	1030	07-07-3	52 40.1	128 28.2	52 39.4	128 28.5	563	622	596	25
	78		29-Oct	1544	1081	07-07-3	52 34.9	128 27.1	52 37.2	128 28.0	708	649	666	23
	79		29-Oct	1623	1129	07-07-3	52 31.3	128 27.8	52 30.6	128 27.6	737	834	790	25
Dean/Burke Channel	80		30-Oct	1938	989	06-08-8	52 20.3	127 28.6	52 20.9	127 28.2	523	516	518	25
	81		30-Oct	2107	1016	06-08-8	52 26.8	127 16.1	52 26.3	127 15.2	507	512	527	25
	82		30-Oct	2243	1070	06-08-8	52 16.8	127 14.8	52 16.3	127 15.6	578	580	582	25
	83		30-Oct	2347	1103	06-08-8	52 14.0	127 24.8	52 13.4	127 25.7	593	591	593	24
	84		31-Oct	0104	1168	06-08-8	52 07.8	127 36.1	52 07.4	127 37.3	446	430	448	25

APPENDIX B DETAILS OF SETS COMPLETED DURING THE 2004 TAGGING CHARTER (F/V MILBANKE SOUND).

Sets are listed sequentially by the start date. The locality name, the type of set (Type 1 traditional or Type 3 random), target depth and area stratum, the start date and time as well as the duration in minutes are shown for each set. Position data include the Groundfish Major, Minor, and Locality area coding as well as the start and end latitude and longitude in degrees and decimal minutes. The bottom depth (m) at the start and end of the set are shown. The mean bottom depth is calculated from recordings at one minute intervals between the start and end of the set. The number of traps fished is also shown and excludes only open traps, while holed or fouled traps are included. All sets were baited with approximately one kilogram of frozen squid in a bait bag and 3-4 kg of frozen Pacific hake loose in each trap.

		Set	Stratum				Duration		Start		End		Bottom depth (m)			Traps
Set	Locality	type	Spatial	Depth	Date	Time	(min)	Area code	Latitude	Longitude	Latitude	Longitude	Start	End	Mean	fished
1	-	3	S_1	RD_3	09-Oct	1046	1355	03-23-10	48 19.5	126 01.4	48 19.0	126 02.1	896	849	876	25
2	-	3	S_1	RD_2	09-Oct	1219	1435	03-23-13	48 14.7	125 52.0	48 14.7	125 53.2	415	538	485	25
3	-	3	S_1	RD_2	09-Oct	1323	1526	03-23-13	48 12.5	125 55.3	48 12.4	125 56.4	636	752	666	25
4	-	3	S_1	RD_3	09-Oct	1502	1568	03-23-	48 10.2	126 06.7	48 09.5	126 07.2	949	1075	1004	25
5	Barkley Canyon	1			09-Oct	1651	1590	03-23-13	48 15.6	125 55.7	48 15.1	125 58.3	576	631	576	62
6	Father Charles Canyon	1			10-Oct	0611	2027	03-23-12	48 31.0	126 12.0	48 31.0	126 14.8	587	711	666	65
7	-	3	S_1	RD_1	10-Oct	1042	1500	03-23-10	48 23.5	126 00.5	48 22.6	126 00.5	243	406	318	24
8	Father Charles Canyon	1			11-Oct	0607	1443	03-23-12	48 36.1	126 13.8	48 35.9	126 16.4	463	830	627	64
9	-	3	S_1	RD_3	11-Oct	0759	1550	03-23-	48 26.8	126 26.9	48 26.3	126 27.6	1183	1258	1222	25
10	-	3	S_1	RD_3	11-Oct	0904	1606	03-23-	48 21.6	126 25.8	48 21.5	126 27.0	1293	1344	1317	26
11	-	3	S_1	RD_1	11-Oct	1415	1474	03-23-10	48 32.8	126 07.0	48 32.2	126 07.9	172	185	181	25
12	-	3	S_1	RD_1	11-Oct	1456	1522	03-23-10	48 28.3	126 07.7	48 27.7	126 08.5	212	247	236	25
13	-	3	S_1	RD_2	12-Oct	1916	1343	03-24-6	48 43.3	126 18.2	48 43.0	126 19.2	503	543	519	25
14	-	3	S_1	RD_2	12-Oct	2041	1387	03-24-6	48 45.2	126 32.5	48 44.6	126 33.5	505	625	571	25
15	-	3	S_1	RD_1	12-Oct	2131	1453	03-24-6	48 47.3	126 30.9	48 46.8	126 31.8	294	346	326	25
16	-	3	S_1	RD_2	12-Oct	2217	1518	03-24-6	48 47.3	126 35.8	48 46.8	126 36.7	485	561	523	25
17	Estevan Point	1			13-Oct	1103	1671	04-25-1	49 03.8	126 56.1	49 03.0	126 58.6	488	702	593	65
18	Estevan Point	1			13-Oct	1234	1864	04-25-1	49 09.7	127 02.8	49 08.9	127 05.3	519	757	642	64
19	-	3	S_2	RD_3	14-Oct	0905	1432	04-25-4	49 25.2	127 26.5	49 24.6	127 27.2	1044	1066	1037	26
20	-	3	S_2	RD_1	14-Oct	1035	1477	04-25-2	49 24.6	127 12.0	49 24.1	127 12.9	176	190	183	26
21	-	3	S_1	RD_3	14-Oct	1200	1517	04-25-2	49 15.4	127 10.5	49 14.7	127 11.0	843	1152	1017	24
22	-	3	S_1	RD_1	14-Oct	1343	1558	04-25-1	49 08.1	126 56.3	49 07.5	126 57.1	291	369	331	25

Set	Locality	Set type	Stratum		Date	Time	Duration (min)	Area code	Start		End		Bottom depth (m)			Traps fished
			Spatial	Depth					Latitude	Longitude	Latitude	Longitude	Start	End	Mean	
23	Esperanza Inlet	1			15-Oct	0627	2111	04-26-8	49 40.9	127 28.4	49 39.0	127 28.9	541	669	598	66
24	-	3	S_2	RD_3	16-Oct	0746	1382	04-25-4	49 26.5	127 23.2	49 25.7	127 23.8	1079	1180	1141	25
25	-	3	S_2	RD_2	16-Oct	0918	1404	04-25-4	49 33.1	127 18.9	49 32.6	127 19.8	849	918	898	25
26	-	3	S_2	RD_2	16-Oct	1039	1429	04-25-4	49 35.1	127 29.7	49 34.4	127 28.7	717	774	744	25
27	-	3	S_2	RD_2	16-Oct	1429	1433	04-26-5	49 57.9	127 49.9	49 58.5	127 50.3	508	741	609	25
28	-	3	S_2	RD_1	18-Oct	0758	1440	04-27-6	50 15.1	128 12.3	50 14.4	128 13.1	843	966	999	24
29	-	3	S_2	RD_1	18-Oct	0932	1468	04-27-3	50 21.9	128 20.3	50 21.7	128 19.1	201	474	278	24
30	-	3	S_2	RD_1	18-Oct	1027	1509	04-27-3	50 25.6	128 21.1	50 25.1	128 21.9	187	190	187	25
31	-	3	S_2	RD_3	18-Oct	1138	1584	04-27-	50 24.7	128 31.2	50 24.2	128 31.9	830	1136	967	26
32	Quatsino Sound	1			18-Oct	1227	1658	04-27-3	50 24.5	128 29.1	50 22.9	128 29.8	470	653	625	66
33	Pisces Canyon	1			20-Oct	0746	1347	05-11-11	50 32.9	128 37.7	50 32.2	128 40.0	463	876	680	66
34	-	3	S_2	RD_2	20-Oct	0958	1364	04-27-	50 27.9	128 35.7	50 27.5	128 36.7	465	657	556	25
35	-	3	S_2	RD_1	20-Oct	1056	1377	04-27-3	50 29.9	128 33.3	50 29.3	128 34.1	225	258	294	24
36	-	3	S_2	RD_2	20-Oct	1145	1419	05-11-11	50 32.3	128 36.1	50 31.6	128 36.9	507	642	664	26
37	-	3	S_2	RD_3	20-Oct	1504	1557	05-11-10	50 40.8	129 04.9	50 40.0	129 05.0	874	1097	1015	25
38	Pisces Canyon	1			20-Oct	1730	1175	05-11-6	50 35.7	128 40.9	50 34.4	128 43.3	552	726	666	67
39	-	3	S_2	RD_3	21-Oct	1927	1345	05-11-10	50 45.1	129 23.8	50 44.8	129 24.5	830	1161	1035	25
40	-	3	S_3	RD_3	21-Oct	2040	1413	05-11-10	50 48.3	129 29.1	50 47.8	129 30.0	836	1280	1017	24
41	-	3	S_3	RD_1	22-Oct	0955	1567	06-08-10	51 16.3	129 56.6	51 15.6	129 57.6	267	280	276	21
42	-	3	S_3	RD_2	22-Oct	1111	1614	05-11-12	51 12.2	130 05.0	51 11.7	130 05.8	666	722	715	25
43	-	3	S_3	RD_2	22-Oct	1343	1648	05-11-12	51 05.7	129 39.2	51 05.2	129 39.8	521	552	541	25
44	Triangle Island	1			22-Oct	1424	1690	05-11-7	51 03.8	129 37.3	51 02.4	129 38.8	565	814	722	65
45	Middle Ground	1			23-Oct	0646	1763	06-08-10	51 16.8	130 04.6	51 17.9	130 06.2	477	622	585	65
46	-	3	S_3	RD_3	23-Oct	0823	1416	06-08-10	51 16.7	130 15.6	51 17.4	130 15.4	1117	1240	1196	25
47	-	3	S_3	RD_3	23-Oct	1019	1447	05-11-12	51 15.2	130 11.5	51 14.7	130 12.4	1006	1075	1031	25
48	Middle Ground	1			23-Oct	2244	971	06-08-10	51 15.4	130 01.6	51 14.6	130 03.8	470	596	541	61
49	-	3	S_3	RD_3	25-Oct	0826	1437	06-08-14	51 41.0	130 34.0	51 40.4	130 33.1	1041	1101	1077	26
50	Cape St. James	1			25-Oct	0921	1513	06-08-14	51 37.9	130 26.9	51 39.6	130 27.3	492	739	644	64
51	-	3	S_3	RD_2	25-Oct	1054	1718	06-08-14	51 36.6	130 14.3	51 35.9	130 13.5	653	732	728	24
52	-	3	S_3	RD_3	25-Oct	1141	1550	06-08-14	51 33.9	130 15.1	51 33.4	130 15.9	858	861	863	26
53	-	3	S_3	RD_1	25-Oct	1339	1705	06-08-14	51 36.2	129 54.6	51 35.8	129 53.7	225	219	223	25
54	-	3	S_3	RD_1	25-Oct	1551	2556	06-08-11	51 44.2	130 12.8	51 43.6	130 13.9	229	256	229	25
55	-	3	S_3	RD_2	25-Oct	1706	2597	06-08-6	51 46.6	130 24.9	51 45.9	130 25.9	465	534	503	25

Set	Locality	Set type	Stratum		Date	Time	Duration (min)	Area code	Start		End		Bottom depth (m)			Traps fished
			Spatial	Depth					Latitude	Longitude	Latitude	Longitude	Start	End	Mean	
56	-	3	S_3	RD_2	26-Oct	2249	1120	06-08-6	51 45.1	130 30.1	51 44.6	130 30.9	552	757	627	25
57	-	3	S_3	RD_1	27-Oct	0005	1203	06-08-6	51 47.5	130 42.5	51 46.9	130 43.3	428	428	446	25
58	-	3	S_3	RD_1	27-Oct	0223	1277	06-08-6	51 59.4	130 28.0	51 59.5	130 27.0	419	437	435	24
59	-	3	S_4	RD_1	28-Oct	1149	1340	09-34-1	52 02.0	131 17.3	52 01.5	131 18.2	234	241	236	24
60	-	3	S_4	RD_3	28-Oct	1249	1422	09-34-1	52 01.7	131 26.1	52 01.5	131 25.2	1006	1202	1139	23
61	-	3	S_4	RD_1	28-Oct	1351	1457	09-34-1	52 03.9	131 17.7	52 03.4	131 18.5	214	221	216	25
62	-	3	S_4	RD_2	28-Oct	1459	1521	09-34-1	52 08.5	131 24.5	52 07.8	131 24.9	545	682	719	25
63	-	3	S_4	RD_2	28-Oct	1543	1560	09-34-5	52 09.5	131 26.5	52 08.9	131 27.1	735	783	774	25
64	-	3	S_4	RD_2	29-Oct	1906	1346	09-34-5	52 09.0	131 30.6	52 09.7	131 29.6	435	874	700	24
65	-	3	S_4	RD_3	29-Oct	2008	1389	09-34-5	52 14.7	131 33.7	52 14.2	131 34.6	843	1041	927	25
66	-	3	S_4	RD_1	30-Oct	1021	1349	09-34-3	52 28.6	131 43.9	52 29.1	131 44.9	150	146	150	24
67	-	3	S_4	RD_1	30-Oct	1211	1393	09-34-3	52 20.1	131 36.2	52 20.6	131 37.0	187	168	177	25
68	-	3	S_4	RD_2	30-Oct	1303	1461	09-34-3	52 18.6	131 36.5	52 17.8	131 37.1	583	823	786	22
69	Gowgaia Bay	1			30-Oct	1411	4353	09-34-3	52 19.2	131 37.5	52 20.2	131 39.2	671	715	715	63
70	-	3	S_4	RD_3	30-Oct	2037	3683	09-34-5	52 15.6	131 35.4	52 15.1	131 36.5	922	1148	1042	24
71	-	3	S_4	RD_3	30-Oct	2123	3722	09-34-5	52 16.7	131 35.9	52 16.1	131 36.7	852	1000	911	24
72	Tasu Sound	1			02-Nov	1924	1144	09-34-4	52 38.0	132 03.5	52 39.1	132 05.3	499	596	704	64
73	Tasu Sound	1			02-Nov	2023	1241	09-31-13	52 40.3	132 06.3	52 40.6	132 07.3	673	858	730	24
74	-	3	S_4	RD_1	02-Nov	2110	1275	09-31-13	52 42.9	132 07.6	52 42.3	132 08.4	159	358	188	25
75	-	3	S_4	RD_3	05-Nov	1007	1343	09-31-	53 00.4	132 39.2	52 59.7	132 40.1	1227	1293	1278	23
76	-	3	S_4	RD_2	05-Nov	1150	1356	09-31-3	53 07.8	132 41.7	53 07.2	132 42.6	550	689	614	25
77	Buck Point	1			05-Nov	1241	1209	09-31-7	53 09.6	132 43.4	53 08.2	132 45.8	549	728	655	65
78	-	3	S_5	RD_3	05-Nov	1500	1487	09-31-	53 06.9	133 03.2	53 06.4	133 04.1	1309	1315	1315	25
79	-	3	S_5	RD_2	06-Nov	1208	1390	09-31-7	53 13.0	132 49.3	53 12.4	132 50.4	706	761	739	25
80	-	3	S_5	RD_1	06-Nov	1257	1432	09-31-7	53 15.0	132 46.5	53 14.3	132 47.3	161	457	371	25
81	-	3	S_5	RD_2	06-Nov	1345	1479	09-31-15	53 16.1	132 51.6	53 15.5	132 52.6	609	675	653	24
82	-	3	S_5	RD_2	06-Nov	1748	2436	09-31-14	53 15.5	133 07.8	53 15.0	133 08.9	717	726	717	25
83	-	3	S_5	RD_2	06-Nov	1836	2488	09-31-14	53 17.3	133 13.7	53 16.7	133 14.7	604	569	578	25
84	-	3	S_5	RD_1	07-Nov	1618	1285	09-31-14	53 20.0	133 06.5	53 19.3	133 07.4	256	432	360	25
85	-	3	S_5	RD_3	07-Nov	1709	1326	09-31-14	53 20.9	133 11.9	53 20.2	133 12.9	1000	1022	1031	25
86	-	3	S_5	RD_3	07-Nov	1744	1378	09-31-14	53 20.9	133 13.6	53 20.3	133 14.4	1035	1000	1028	26
87	Hippa Island	1			07-Nov	1924	2367	09-31-1	53 27.4	133 03.7	53 28.2	133 06.7	486	779	569	65
88	Rennell Sound	1			07-Nov	2009	2853	09-31-12	53 29.4	133 07.2	53 31.0	133 09.1	457	496	567	65

Set	Locality	Set type	Stratum		Date	Time	Duration (min)	Area code	Start		End		Bottom depth (m)			Traps fished
			Spatial	Depth					Latitude	Longitude	Latitude	Longitude	Start	End	Mean	
89	-	3	S_5	RD_3	08-Nov	1839	1271	09-31-1	53 28.2	133 14.4	53 27.5	133 15.4	984	1297	1101	27
90	-	3	S_5	RD_1	08-Nov	1956	1314	09-31-12	53 34.4	133 15.4	53 33.8	133 16.3	282	360	316	25
91	-	3	S_5	RD_1	08-Nov	2106	1515	09-31-6	53 36.6	133 08.8	53 36.1	133 08.7	221	499	454	25
92	-	3	S_5	RD_3	10-Nov	0757	1327	09-31-	53 58.1	133 51.2	53 57.6	133 51.1	1136	1152	1147	25
93	Langara Island-North Frederick	1			10-Nov	0926	1356	09-35-6	54 03.7	133 41.1	54 04.5	133 43.8	448	717	609	67
94	-	3	S_5	RD_2	10-Nov	1016	1439	09-35-6	54 06.0	133 42.0	54 05.4	133 43.0	483	613	560	25
95	-	3	S_5	RD_1	10-Nov	1219	1472	09-35-6	54 20.1	133 43.7	54 19.5	133 44.6	247	247	247	25

APPENDIX C EXAMPLE DATA FORMS.

SABLEFISH CHARTER SETTING BRIDGE LOG

VESSEL: Ocean Marauder SET NUMBER: 3

LOCALITY: Barkley Canyon REASON: Standardized

Intended Stratum: 22 Recorder: Mahlo

Target Depth: Minimum: 250 (fm) Maximum: 340 (fm)

SET: Date: Oct 6 2004

1st Buoy: Number: 17 Time: 0741 Bottom Depth: 278 (fm)

Latitude: 48 19.228 Longitude: 125 54.611

1st Anchor : Time: 752 Bottom Depth: 256 (fm)

Latitude: 48 19.833 Longitude: 125 54.513

SETTING BOTTOM DEPTH (fm/min): 254, 252, 255, 256, 258, 262, 261, 272, 276, 282, 284,

Mean: (of fm/min)

2nd Anchor: Time: 903 Bottom Depth: 284 (fm)

Latitude: 48 19.708 Longitude: 125 55.452

2nd Buoy: Number: 18 Time: 808 Bottom Depth: (fm)

Latitude: 48 19.625 Longitude: 125 56.054

COMMENTS:

Figure C.1. Example of a completed bridge log data form used on the 2004 survey. This form was completed from the bridge as each string was set.

SABLEFISH CHARTER SET LOG

VESSEL: OCEAN MARINER SET NUMBER: #75

DATE: OCT 29/04 Recorder: J MANNING

1st Buoy Number: #2 Time: 1322

1st ANCHOR TIME 1330 (2+)

NUMBER TRAPS SET: HH HH HH HH HH

TEMP SENSOR: #: 1317 On Trap #: 3

Missed Beckets: — o —

2nd ANCHOR TIME 1341

2nd Buoy Number: #10 Time: 1346

BAIT: Type 1: SQUID Weight: 2 POUND (lb) Method: BAG

Type 2: — Weight: — (lb) Method: —

Bait sampled? (circle one) (Y) N

COMMENTS:

BAIT WEIGHT QUALITY CONTROL Date Sampled:

Bait Type: Sampler:

SOURCE: Vessel: Set(s):

Gross Weight/Bag 1:	2:	3:	4:	
5:	6:	7:	8:	9:
10:	11:	12:	13:	14:
15:	16:	17:	18:	19:
20:	21:	22:	23:	24:
25:	26:	27:	28:	29:

FROZEN BAIT SAMPLE TAG Date Sampled:

Bait Type: Sampler:

SOURCE: Vessel: Set:

From Freezer: Supplier:

Figure C.2. Example of a completed set log data form used on the 2004 survey. This form was completed from the deck as the gear was set.

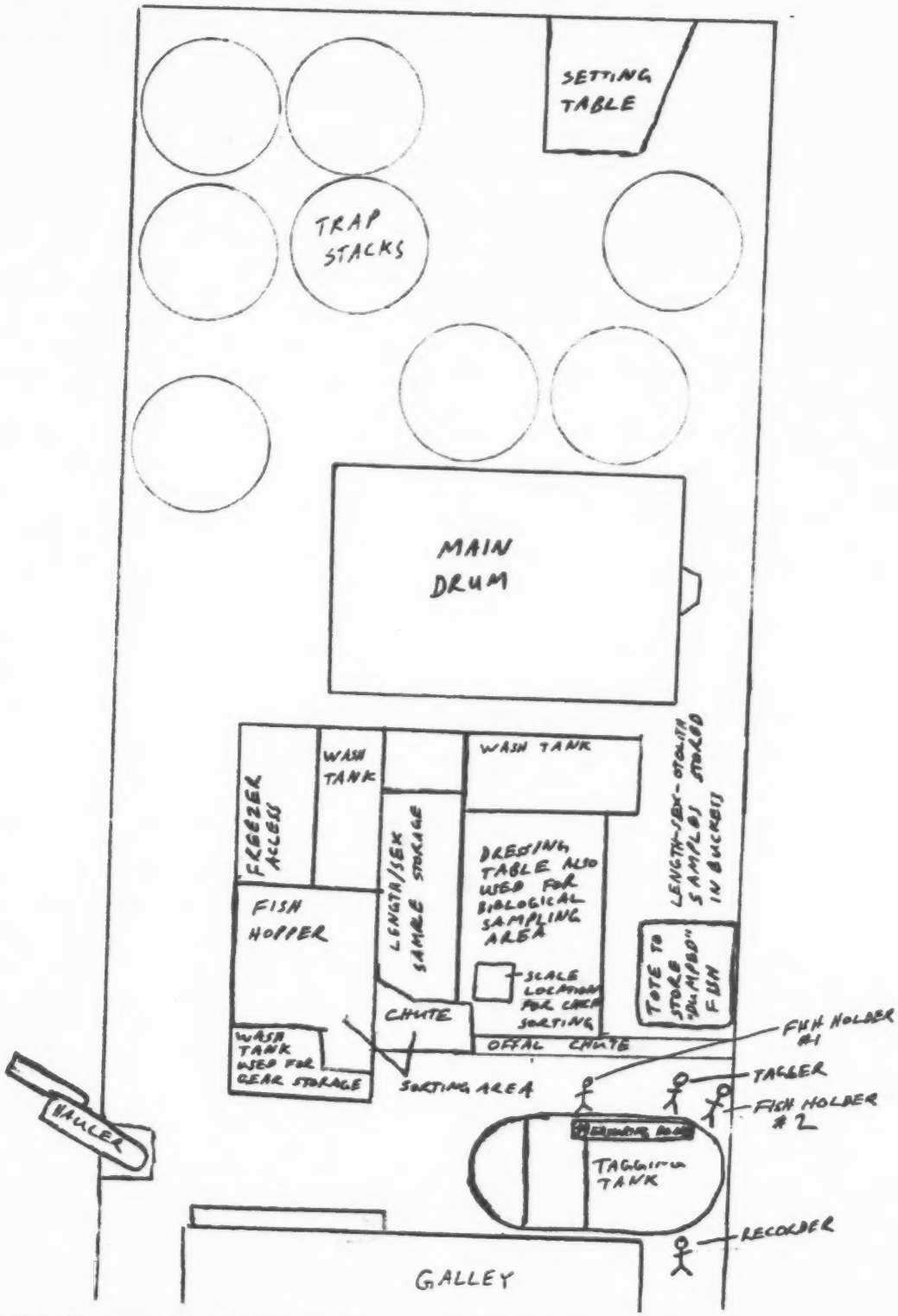


Figure C.3. Diagram of the F/V Ocean Marauder deck showing how the space was used for survey activities. The diagram is not to scale.

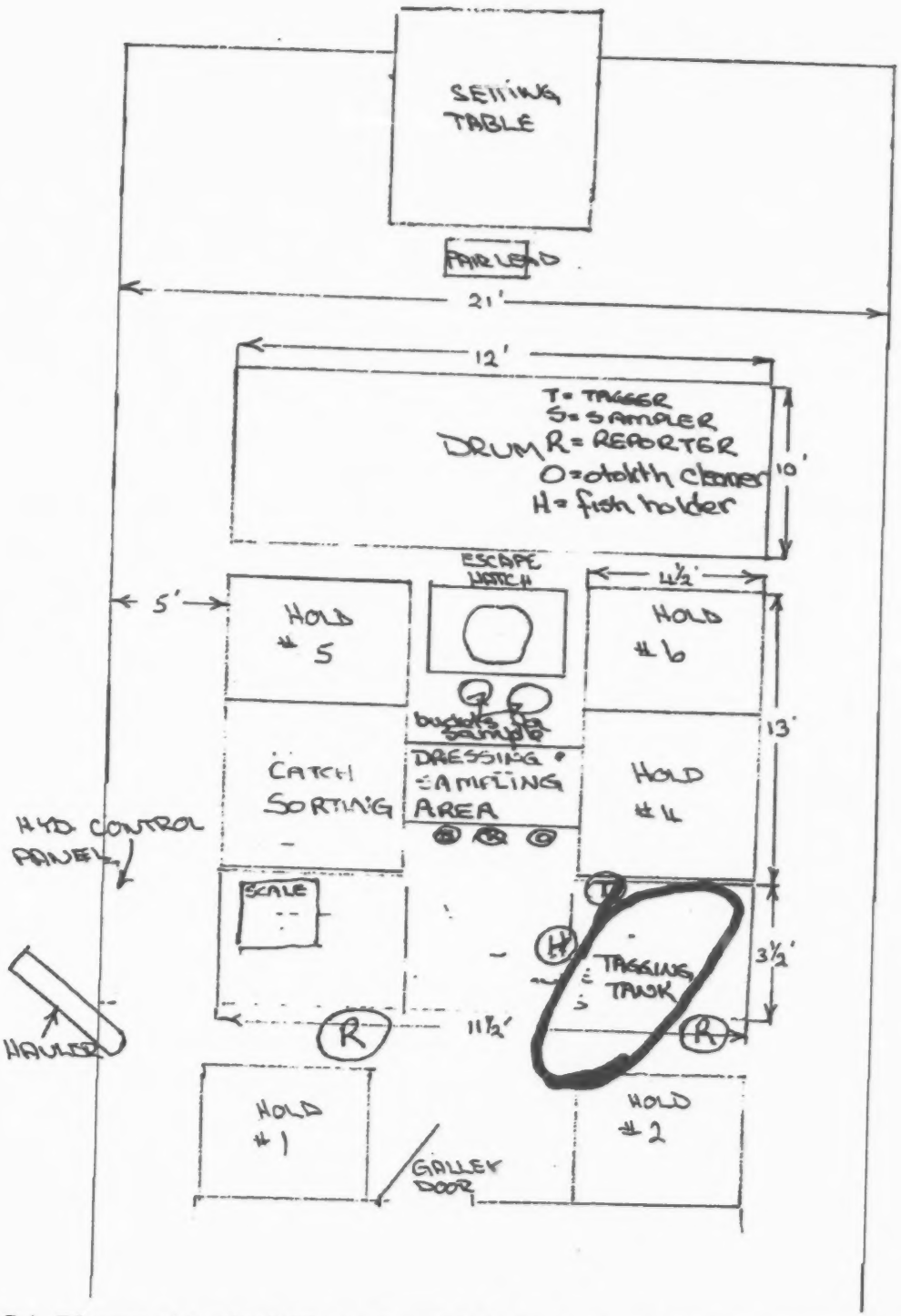


Figure C.4. Diagram of the F/V Milbanke Sound deck showing how the space was used for survey activities. The diagram is not to scale.

SABLEFISH CHARTER CATCH LOG

DATE: Oct 24/04 SET NUMBER: 059 pg 1 / 1

VESSEL: OCEAN MARAUDER RECORDER: HAWES

1ST Buoy # 8 HHMM 0618 1ST Anchor Aboard: HHMM 0649

trap	SABLEFISH			species 2		species 3		species 4		species 5		species 6	
num	Use	#	weight	#	weight	#	weight	#	weight	#	weight	#	weight
1													
2	A	1	2.4										
3	A	1	2.4							1	.3	1	1.0
4													
5	A	3	11.2									2	2.3
6	A	1	3.4										
7													
8													
9													
10													
11													
12	A	4	12.4										
13	A	6	21.6									1	1.7
14								1	[illegible]				
15													
16													
17													
18						1	[illegible]						
19	A	5	17.3										
20													
21	A	3	5.1			1	.1						
22										1	1.1		
23													
24													
25	A	1	7.2							1	.7		

2ND Buoy # 1 HHMM 0726 2ND Anchor Aboard: HHMM 0713

COMMENTS: 22+23+20 + 21 [illegible]

[illegible] OF LOST 1 [illegible] OUT OF [illegible]

The "Use" column is to indicate how the trap contents was treated: T=tagged, A=LSWMO sample, B=LF sample, D=dumped

Figure C.5. Example of a completed catch log data form used during the 2004 survey.

SABLEFISH CHARTER CATCH LOG DATA ENTRY FORM

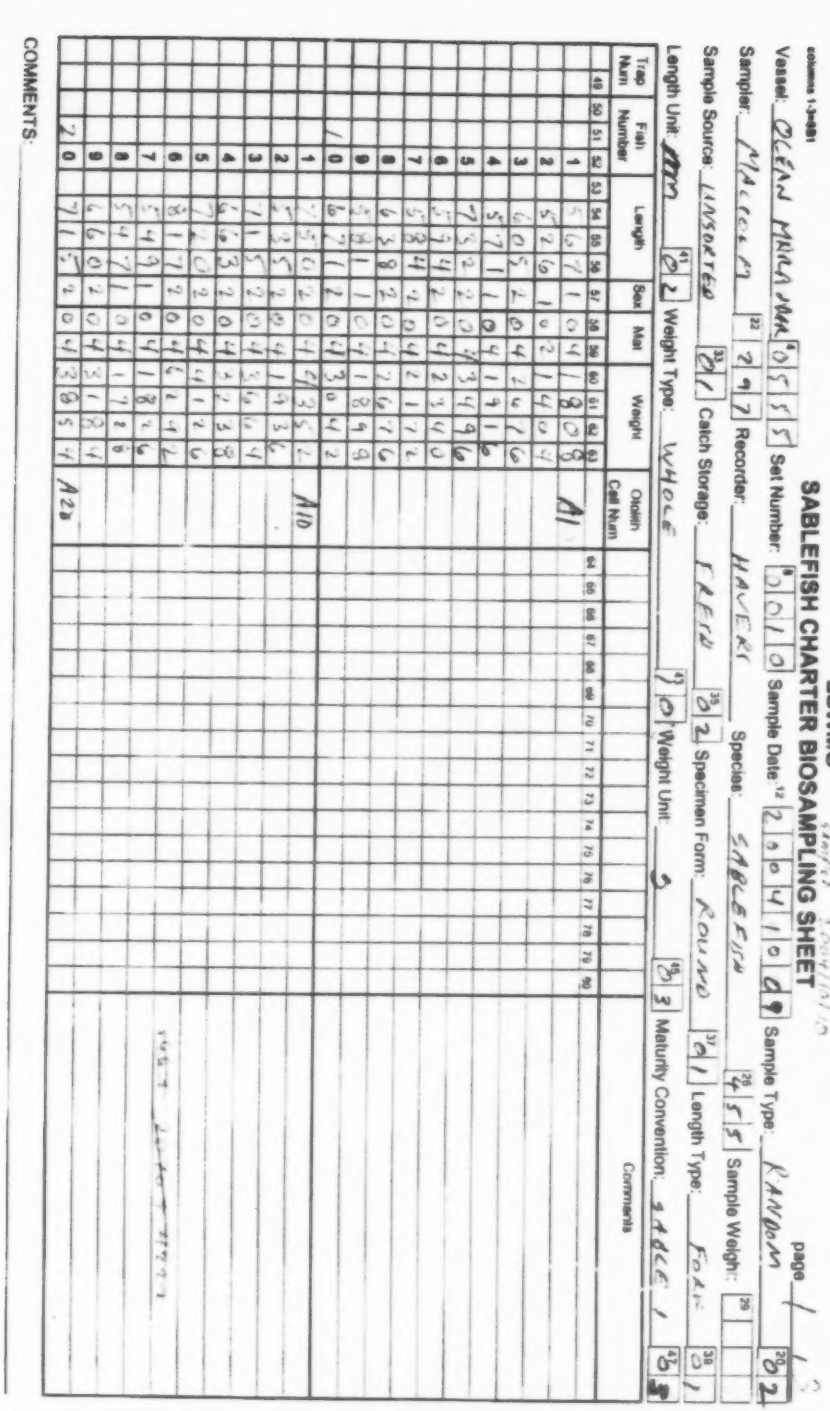
DATE: OCT 11/04 SET NUMBER: 5 3 9 pg 1 / 1

VESSEL: OCEAN MARAUDER RECORDER: HAWES

Trap Num	Species Code	Count	Weight (kg)	Verification Method	Trap Usability	Catch Comment	Trap Comment
001	455	5	14.20			A	
002	455	7	19.42			B	
003	455	6	24.80			B	
004	455	8	21.60			A	
005	455	8	23.75			B	
006	455	12	34.00			B	
007	455	11	34.70			D	
008	455	10	27.42			A	
009	455	10	26.42			B	
010	455	11	28.30			D	
011	455	5	15.10			D	
012	455	9	24.94			B	
013	455	7	19.53			A	
014	455	19	48.90			D	
015	455	18	43.50			D	
016	455	22	53.50			B	
017	455	11	37.80			D	
018	455	8	21.30			D	
019	455	21	58.05			A	
020	455	19	51.20			D	
021	455	21	46.80			D	
022	455	3	9.70			D	
023	455	22	57.70			B	Trap pulled
024	455	32	77.50			D	
025	999						

455 TOTAL
206 829.05

Figure C.6. Example of a completed catch log data entry form used during the 2004 survey.



LSWMO

SABLEFISH CHARTER BIOSAMPLING SHEET

Vessel: OCEAN MIRA MAR [6][5][5][5] Set Number: [6][0][1][0] Sample Date: [12] [2][9][4] [1][0][d] Sample Type: RANDOM page 1 of 2

Sampler: MIKE ECK [22] [7][7][7] Recorder: MAUREEN Species: SABLEFISH [24] [5][5] Sample Weight: [29]

Sample Source: LANDED [32] [2][1] Catch Storage: ICED [35] [2] Specimen Form: ROUND [37] [1] Length Type: FORK [38] [1]

Length Unit: MM [41] [2] Weight Type: WHOLE [43] [0] Weight Unit: [5] [3] Maturity Convention: TABLE 1 [45]

Trap Num	Fish Number	Length	Sex	Maturity	Weight	Otolith Cell Num	Comments
49 50	51 52	53 54 55	56	57 58 59 60	61 62 63	64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80	
	1	5 6 7	1	0 4 1	1 8 0 3	A1	
	2	5 7 6	1	0 2 1	4 0 4		
	3	6 0 5	2	0 4 2	4 6 1 6		
	4	5 7 1	1	0 4 1	9 1 6		
	5	7 5 2	2	0 3 4	9 9 6		
	6	5 9 4	2	0 4 2	3 4 3		
	7	5 8 4	2	0 4 2	1 1 2		
	8	6 3 8	2	0 4 2	1 7 6		
	9	5 8 1	1	0 4 1	8 9 9		
	10	6 7 1	2	0 4 3	0 4 2		
	1	5 5 0	2	0 4 1	3 5 1	A10	
	2	5 3 5	2	0 4 1	9 3 6		
	3	1 1 5	2	0 4 1	3 4 4		
	4	5 6 3	2	0 4 2	3 3 8		
	5	5 8 0	2	0 4 1	1 2 6		
	6	8 1 7	2	0 4 2	1 4 6		
	7	5 4 9	1	0 4 1	8 4 6		
	8	5 4 7	1	0 4 1	7 2 6		
	9	4 6 0	2	0 4 3	1 2 4		
	20	7 1 5	2	0 4 3	8 5 4	A20	

COMMENTS:

Figure C.7. Example of a completed biological sampling form used for LS(W)MO samples during the 2004 survey.

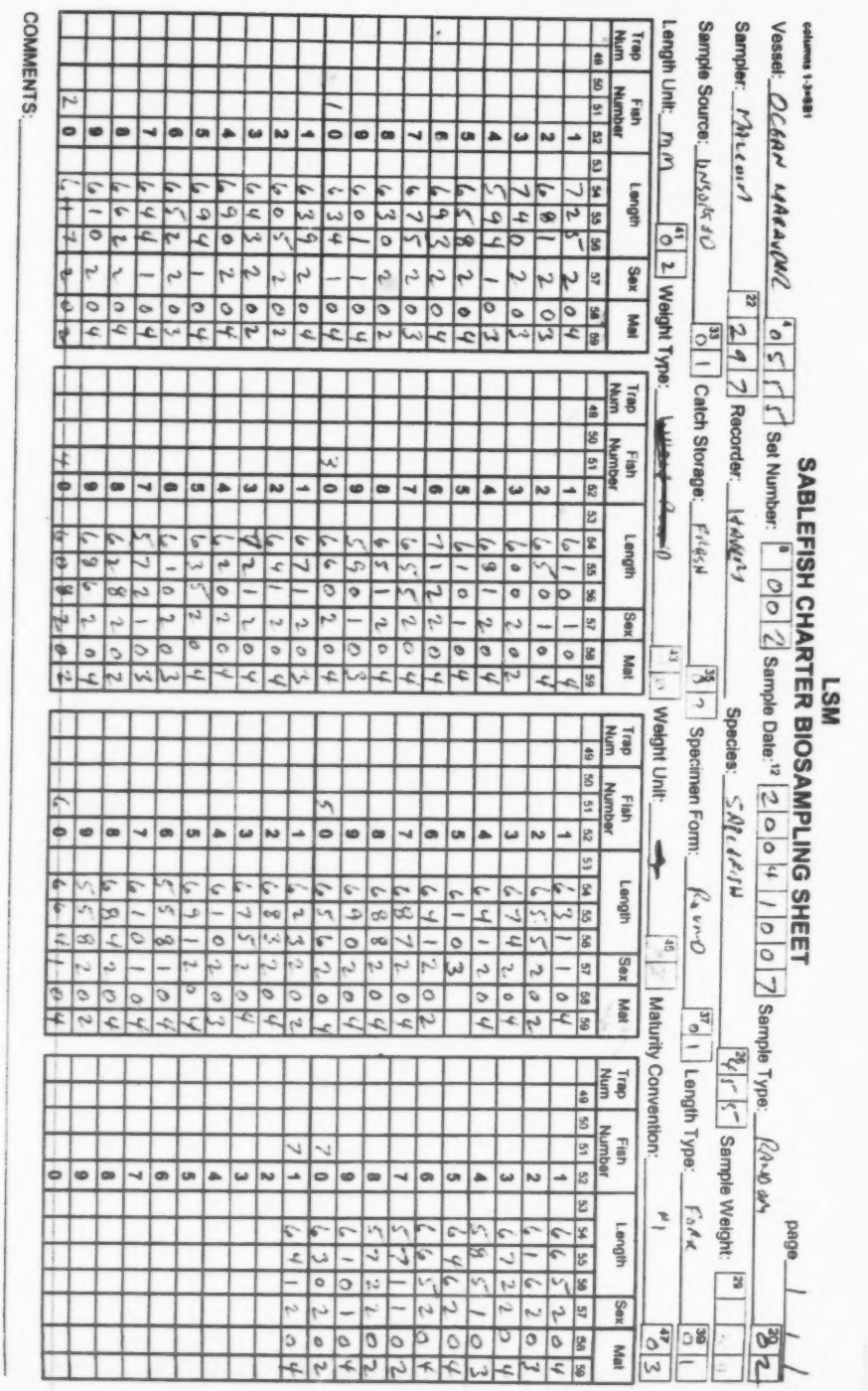


Figure C.8. Example of a completed biological sampling form used for LSM samples during the 2004 survey.

2°

GFBIO TRIP ID 56000 57360

SABLEFISH CHARTER TAG RECOVERY SHEET

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Vessel: OCEAN MARAUDER Sample Type: TAGGED FISH

Sampler: Recorder: Species: SABLEFISH Sample Weight:

Sample Source: Catch Storage: LIVE Specimen Form: ROUND Length Type:

Length Unit: Weight Type: Weight Unit: Maturity Convention:

Set Number	Set Haul Date (Y Y Y Y M M D D)	Tag Number	Length	Sex	Mat	Weight	Wound Cond.	Otolith Tray #	Otolith Cell #	Comments
004	20040107	CSA01775					01			re-released
		CSA01541					01			"
		A0078665 0					01			"
004	20040107	A0078661 4					01			"
005	20040107	B8365993					01			"
005	20040107	B95 0266					01			"
006	20040107	CSA00434					01			"
007	20040107	CSA00172					01			"
008	20040107	CSA00489					01			"
003	20040107	CSA27975					01			"
013	20040107	A0029805 7					01			"
013	20040107	B7729783	625	2	04	2540	01		A02	sampled
025	20040133	A0015021 8	602				01			re-released
026	20040133	A0029542 9	583				01			"
027	20040133	A0055346 1	588				01			"
028	20040133	A0029537 5	580				01			"
028	20040133	A0029537 0	654				01			"
028	20040133	A0029542 3	564				01			"
028	20040133	A0025554 5 4	587				01			"
007	20040107	SA25862	573	2	04		02		A01	sampled

Tag Wound Condition: blank = unknown; 00 = not examined; 01 = normal to slightly exposed (good); 02 = enlarged and raw; 04 = anchor good, suture exposed (2 tags present); 05 = anchor exposed, suture good (2 tags present); 06 = tag too tight; 07 = tag too loose; 99 = tag missing, wound only

Figure C.9. Example of a completed tag recovery form used during the 2004 survey.

columns 1-3=ST1

SABLEFISH CHARTER TAGGING SHEET

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Vessel: OCEAN MARAUDER [4] 5 5 5 Set Number: [8] 0 6 6

Date:[11] 2 0 0 4 1 0 2 6 Sample Type: RANDOM [19] 0 2

Tagger: MANNING [21] 3 8 3 Recorder: HAVERS [25] 2 7 4

Species: SABLEFISH [29] 4 5 Tag Type: ANCHOR [32] 1 0

Tag Check	Primary Tag Number prefix [35-37]						Fork Length (mm)			Error 1	Error 2	Injury 1	Injury 2	Comments
	A	0	0											
34	38	39	40	41	42	43	44	45	46	47	48	49	50	51	
						0									
						1									
						2									
						3									
0	6	7	3	5	3	4		5	9	0					
1						5		6	6	1					
1						6		6	4	5					
1						7		5	8	2					
1						8		5	6	0					
1						9		5	7	6			C		
1						0		6	2	0					
1						1		~~4~~	~~4~~	~~4~~	U				
0	6	7	3	5	4	2		6	1	4					
0	6	7	3	5	4	3		5	5	0					
						4		6	2	2					
						5		5	8	6					
						6		6	0	3					
						7		6	5	0			D		
						8		6	6	3					
0	6	7	3	5	4	9		5	8	4					
0	6	7	3	5	5	0		6	0	0					
						1		6	0	1					
						2		5	9	5					
						3		6	1	4					
						4		5	8	9					
0	6	7	3	5	5	5		7	2	3					723
						6		6	3	5					
						7		5	6	4					
						8		5	9	8					
						9		5	6	0					
0	6	7	3	5	6	0		5	4	0					
						1		5	4	1					541
						2		5	7	4					
						3		6	0	2					
						4		5	7	8					
						5		6	0	0					
0	6	7	3	5	6	6		5	3	1					
						7		5	7	0					
						8		5	8	5					
						9		6	2	8					

COMMENTS:

598 723

Sample Type:
- 1 = total catch
- 2 = random
- 4 = selected
- 9 = juveniles
- 10 = adults

Tag Type:
- 10 = anchor
- 20 = suture
- 30 = Peterson disc

Tag Check:
- null = tag number not verified
- 0 = tag number verified and corresponds to fish data
- 1 = tag number may not correspond to fish data

Error:
- B = tag broken, not used
- D = dead fish, tagged
- P = paired tag, sequential tags in same fish
- N = tag not well implanted
- L = loose tag
- T = tight tag
- R = release of OTC from hole
- U = unknown length

Injury:
- A = damage from amphipods
- B = bleeding
- C = cuts or fresh wounds
- D = fish dropped on deck
- E = eyes cloudy, blind
- F = fin damaged
- H = misshapen fish
- L = scale loss
- N = scrapes and abrasion
- O = bleeding at OTC hole
- R = raw wound around tag
- S = scar of healing wound
- T = tail damaged

Figure C.10. Example of a completed tagging form used during the 2004 survey.

APPENDIX D SABLEFISH GONAD MATURITY STAGES

Maturity stage	Code	Males	Females
Immature 1	01	very thin string-like >1 mm thick, translucent white colour	thin string-like =1.5mm thick mid-section, translucent-white colour
Immature 2	02	thin string-like 3mm thick, extends length of cavity, white-translucent colour	thickened >5mm, does not extend length of cavity, some folds sausage like translucent-white colour
Ripening 1	03	thick >10mm visible folds, white smooth texture, =20% body cavity	eggs present, white opaque colour encased in translucent sock, <25% of body cavity
Ripening 2	04	as above but with blood vessels present on surface, >30% body cavity	eggs larger =1mm diameter, white in colour, blood vessels present on surface, >25% of body cavity
Ripe	05	as above blood vessels present, folds delicate, some sperm may flow, >40% of body cavity	eggs at least 1mm diameter, white in colour, gonad full size, >50% of body cavity
Ripe 1	06	no stage in males	gonad same size as above but at least 25% of eggs have become translucent
Ripe 2	07	no stage in males	gonad same size as above but at least 50% of eggs have become translucent
Running Ripe	08	lobes fully developed, sperm is released when slight pressure is applied to external posterior region of body cavity	stream of translucent eggs released when slight-moderate pressure is applied to external posterior region of body cavity
Spent	09	lobes or folds are bloodshot, some sperm may be present when moderate pressure is applied to external posterior region of body cavity	gonad is red-purple in colour, residual eggs may be present, outer wall of gonad flaccid
Resorbing	10	no stage in males	eggs present but did not function normally (not normal)
Recovering	11	lobes flat, brown in colour, bloodshot appearance on edges and ends of lobes	still some red purple colour, not flaccid, whitish sheen to exterior surface
Resting	12	firm, light brown colour, some wrinkles on surface	smooth elongated and round in shape, brown purple pulp interior, exterior surface has whitish sheen

APPENDIX E SUMMARY OF TRAP USE DURING THE 2004 STANDARDIZED CHARTER (F/V OCEAN MARAUDER)

The fate of the sablefish catch for each trap within each set is indicated using the following abbreviations:

Code	Sablefish use category
D	Discarded after weighing (processed as commercial catch)
A	Sampled for LSM(W)O
B	Sampled for LSM
T	Tagged and released
-	No sablefish catch
blank	Trap missing or not fishing

Trap numbers are arranged in rows and each column is a set. The total numbers of traps assigned to each use category within each set are also shown.

Trap	Set 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	A	-	-	A	A	A	A	A	A	A	A	A	A	-	-	A	A	A	A	A	-	A	-	A	-
2	B	B	B	B	B	-	-	A	A	-	A	B	B	B	D	A	B	B	B	A	A	-	-	A	B
3	B	D	D	B	A	A	-	A	-	-	B	D	D	D	-	-	-	B	B	A	A	-	A	-	A
4	B	A	A	A	B	A	A	-	A	-	B	B	D	D	-	-	-	B	A	A	B	-	A	-	B
5	A	B	D	B	A	B	-	A	-	B	A	B	B	D	-	-	B	A	B	A	B	A	A	-	A
6	B	D	D	B	B	A	A	-	A	A	A	A	A	D	-	A	B	B	B	A	A	-	A	A	B
7	B	-	B	A	A	A	A	-	-	B	B	B	D	B	-	-	D	D	D	A	B	-	A	A	A
8	B	D	D	B	B	A	-	A	-	A	B	D	D	A	D	A	A	B	A	A	-	-	A	A	B
9	B	B	D	-	A	A	-	A	-	B	B	B	B	D	-	-	B	D	B	A	-	A	-	-	A
10	A	A	D	A	B	B	A	A	-	A	A	B	D	D	-	-	B	A	D	A	-	-	-	A	-
11	B	-	B	B	A	A	-	-	-	B	B	A	A	D	-	-	D	B	D	A	A	-	-	-	-
12	D	D	D	B	-	-	A	A	A	A	B	B	D	D	-	-	-	D	B	-	A	-	-	-	A
13	B	D	D	A	A	A	A	-	-	B	B	-	D	D	-	-	A	D	A	A	-	-	-	-	A
14	B	B	D	B	-	A	A	A	-	A	-	A	B	D	-	-	B	A	D	A	A	-	-	A	A
15	A	D	B	B	A	B	-	-	-	B	A	B	A	D	-	-	B	B	D	-	A	A	-	A	B
16	D	D	D	A	B	A	B	-	-	-	B	B	D	D	-	-	D	D	B	A	B	-	-	-	-
17	B	A	D	B	A	A	A	A	A	A	B	-	D	D	D	A	-	D	D	A	-	-	-	-	-
18	D	B	D	B	B	A	-	-	A	B	B	A	B	A	-	-	A	D	D	A	A	-	A	A	-
19	B	-	B	B	-	A	A	-	A	A	A	B	D	B	-	-	B	B	A	A	-	-	-	A	A
20	A	B	D	A	B	-	B	A	-	B	B	A	D	D	-	-	B	D	D	A	A	-	A	-	A
21	-	B	A	B	A	-	B	-	A	A	B	B	B	D	D	-	A	D	D	-	A	-	-	-	A
22	B	A	D	B	B	A	-	-	A	B	B	A	D	D	-	-	B	B	D	A	A	-	A	A	A
23	D	B	D	B	A	-	A	-	A	A	A	-	D	B	D	-	B	A	B	A	A	-	-	-	B
24	D	-	D	A	B	A	B	-	A	B	B	A	B	A	D	A	-	D	D	A	A	-	A	A	A
25	A	A	D	B	A	A	B	-	A	A	B	A	D	A	-	-	A	D	-	-	B	A	-	A	
26	D																								
Totals																									
-	1	5	1	1	3	5	9	14	12	4	1	3		1	19	19	5		1	4	7	20	15	12	6
A	6	5	2	8	12	17	11	11	13	11	8	9	4	4		6	6	5	5	21	13	5	10	13	12
B	13	8	5	16	10	3	5			10	16	11	7	4			11	9	8		5				6
D	6	7	17									2	14	16	6		3	11	11						

	Set																								
Trap	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**
1	B	D	B	A	A	B	B	A	A	-	A	-	-	A	A	A	-	-	A	D	B	A	A	A	-
2	A	D	A	A	A	A	D	B	B	A	A	-	-	A	-	B	D	-	-	B	A	D	B	A	-
3	D	B	D	A	A	B	D	B	A	-	-	-	A	A	A	D	B	-	-	D	D	D	-	-	-
4	D	D	B	A	A	D	A	D	B	A	A	-	-	A	-	D	A	-	-	D	D	B	A	-	-
5	B	A	D	A	A	D	B	A	A	-	-	A	A	A	-	B	D	A	A	A	D	D	-	-	-
6	D	D	D	A	A	B	D	B	B	A	A	-	A	-	-	A	D	A	A	D	B	B	A	-	-
7	D	D	A	A	-	-	D	B	A		A	-	-	-	D	D	B	-	-	D	-	B	A	-	A
8	D	D	D	A	-	D	A	D	B	A	A	A	-	A	B	D	A	A	-	B	D	D	A	A	-
9	D	D	D	A	-	D	B	D	A	A	-	-	A	-	A	B	D	A	-	D	D	A	B	A	-
10	B	B	B	A	A	A	D	A	A	-	-	-	-	A	D	D	-	-	A	D	D	B	-	-	A
11	D	D	-	-	A	B	D	B	B	A	-	A	-	A	D	-	D	-	A	B	B	D	-	A	-
12	D	D	D	A	-	D	A	B	A	-	-	-	A	A	B	A	B	-	A	D	D	B	-	A	A
13	D	D	D	-	A	D	B	D	A	A	-	-	A	-	D	B	A	A	-	D	D	-	A	A	-
14	D	B	D	A	A	A	D	D	-	-	A	-	-	-	A	D	D	-	-	A	D	A	A	A	A
15	D	D	B	-	-	B	D	A	B	-	A	-	-	A	-	D	D	-	-	D	-	D	A	-	A
16	D	D	D	A	A	B	-	B	-	A	A	-	-	A	-	D	B	A	-	D	A	B	B	A	-
17	B	D	D	A	-	D	D	B	A	-	-	-	-	A	D	B	D	-	-	B	D	-	-	A	-
18	D	D	D	A	-	-	B	D	A	A	A	-	-	A	B	D	D	-	A	D	-	D	B	-	-
19	D	B	B	A	-	A	A	A	-	A	-	-	A	A	A	D	A	A	A	D	-	D	-	A	-
20	D	D	D	A	A	B	D	B	A	-	A	-	-	A	B	D	B	-	A	B	B	B	B	-	-
21	A	A	A	-	-	B	D	B	B	-	A	-	A	A	B	B	D	-	A	D	A	D	-	A	-
22	D	D	D	-	A	D	D	A	A	A	A	-	-	A	A	D	D	-	A	D	D	D	A	A	A
23	D	D	D	-	-	D	D	B	-	-	-	-	A	A	-	D	B	-	-	B	A	A	B	-	A
24	B	D	B	-	A	B	B	B	A	A	A	-	-	-	B	A	-	A	-	D	B	B	B	A	A
25	A	B	D	-	-	-	D	-	A		-	-	-	A	B	-	A	-	A	D	B	B	-	-	-
26							D																		
Totals																									
-			1	8	11	3	1	1	4	11	11	22	16	6	7	2	3	17	13		4	2	9	11	17
A	3	2	3	17	14	4	4	6	14	12	14	3	9	19	6	4	5	8	12	2	4	4	9	14	8
B	5	5	6			9	6	12	7						7	6	6			6	6	9	7		
D	17	18	15			9	15	6							5	13	11			17	11	10			

	Set																							
Trap	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
1	-	A	-	B	B	D	A	A	-	A	B	B	-	B	-	T	T	D	D	D	T	D	T	D	D
2	-	-	A	D	A	B	-	A	A	-	A	D	-	A	T	D	D	T	-	T	D	T	D	-	T
3	-	A	-	B	-	D	-	-	A	-	A	A	-	B	-	T	T	D	-	D	T	D	T	D	-
4	-	A	B	A	B	-	A	-	-	-	-	D	-	D	T	A	D	T	T	-	D	T	D	T	T
5	-	A	B	D	B	A	A	-	A	-	A	B	-	A	A	-	T	D	-	A	T	D	T	A	A
6	A	A	A	B	A	D	-	-	A	A	B	D	-	D	T	A	D	T	-	T	D	T	A	T	T
7	A	A	-	A	B	B	-	-	-	-	-	B	-	B	-	T	T	A	A	-	T	A	-	D	D
8	-	A	-	D	B	B	A	A	-	A	A	D	-	D	-	A	D	T	T	T	A	T	D	T	T
9	-	A	A	D	A	A	-	-	-	A	B	A	A	A	A	T	-	D	D	A	T	D	T	D	D
10	-	B	-	B	B	-	-	A	-	A	D	D	-	D	-	D	A	T	T	T	D	-	D	T	T
11	A	-	B	D	D	D	-	-	-	-	B	B	-	B	-	T	T	D	D	D	T	A	T	D	D
12	-	-	B	A	D	B	-	-	A	-	D	D	A	D	T	D	D	T	T	T	D	T	D	T	T
13	A	-	-	D	A	B	-	A	A	-	D	B	-	A	A	T	T	D	D	D	T	D	T	D	D
14	A	A	A	D	D	-	-	A	-	A	A	D	A	D	T	D	D	T	T	T	D	T	A	T	T
15	A	-	A	B	B	A	A	-	-	A	D	D	-	B	A	-	T	D	D	D	-	D	T	D	A
16	-	A	B	D	D	A	-	A	-	-	B	B	-	D	-	D	D	T	T	T	D	T	D	-	T
17	-	A	B	D	A	A	-	A	-	A	D	D	-	A	A	T	T	D	D	A	T	D	T	D	D
18	A	-	B	A	D	B	-	-	-	A	D	D	-	D	T	A	D	T	T	T	D	T	A	T	T
19	-	A	-	D	-	B	-	-	A	A	B	A	-	B	-	T	T	D	A	D	T	D	T	D	D
20	A	A	A	D	B	B	-	-	-	-	D	D	A	D	T	D	D	T	T	T	A	T	D	T	T
21	A	B	-	B	D	A	-	-	A	-	D	D	-	A	-	T	T	D	D	D	T	D	T	A	D
22	-		B	D	A	A	-	-	-	A	A	B	-	D	-	A	A	T	T	T	D	T	D	T	T
23	A	A	B	D	B	A	-	-	-	A	B	D	-	B	A	T	T	A	D	D	T	A	T	D	A
24	-	A	B	B	-	B	-	-	-	-	A	D	-	D	T	D	D	T	T	T	D	T	D	T	T
25	-	-	A	D	B	B	A	-	A	-	B	A	-	B	A	T	T	D	D	D	T	-	T	D	D
Totals																									
-	15	7	8		3	3	19	17	16	13	2		21		10	2	1		4	2	1	2	1	2	1
A	10	15	7	4	6	8	6	8	9	12	7	4	4	6	7	5	2	2	2	3	2	3	3	2	3
B		2	10	7	10	10					8	7		8											
D				14	6	4					8	14		11		7	10	11	9	9	10	9	9	11	9
T															8	11	12	12	10	11	12	11	12	10	12

	Set								
Trap	**76**	**77**	**78**	**79**	**80**	**81**	**82**	**83**	**84**
1	T	D	D	-	D	-	D	T	D
2	D	T	T	A	T	A	T	D	T
3	T	D	-	T	-	T	D	T	D
4	D	T	T	-	T	-	T	D	T
5	T	D	A	T	-	T	A	T	D
6	D	T	T	D	T	A	T	A	T
7	T	A	D	T	-	T	D	T	A
8	A	T	T	A	T	A	T	D	T
9	T	D	-	T	A	-	D	T	D
10	D	T	D	D	-	A	-	D	T
11	T	D	T	T	A	-	D	T	D
12	A	T	D	D	-	A	T	D	T
13	T	D	T	T	A	T	D	T	D
14	D	T	A	A	-	D	T	-	T
15	T	A	D	T	A	T	D	T	D
16	D	T	T	D	T	D	T	D	T
17	T	D	D	T	-	T	A	T	D
18	D	T	-	D	-	D	T	D	T
19	T	A	D	T	A	T	D	T	D
20	D	T	T	D	T	D	T	D	T
21	T	D	D	T	-	-	D	T	D
22	-	T	T	A	T	D	T	A	T
23	A	D	D	T	-	T	D	T	A
24	-	T	T	D	T	A	T	D	T
25	D	D	D	T	-	D	A	T	D
Totals									
-	2		3	2	11	5	1	1	
A	3	3	2	4	5	6	3	2	2
D	9	10	10	7	1	6	10	9	11
T	11	12	10	12	8	8	11	13	12

APPENDIX F SUMMARY OF TRAP USE DURING THE 2004 TAGGING CHARTER (F/V MILBANKE SOUND)

The fate of the sablefish catch for each trap within each set is indicated using the following abbreviations:

Code	Sablefish use category
D	Discarded after weighing (processed as commercial catch)
A	Sampled for LSM(W)O
B	Sampled for LSM
T	Tagged and released
-	No sablefish catch
blank	Trap missing or not fishing

Trap numbers are arranged in rows and each column is a set. The total numbers of traps assigned to each use category within each set are also shown.

	Set																							
Trap	**1**	**2**	**3**	**4**	**7**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**19**	**20**	**21**	**22**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
1	T	A	D	T	T	D	-	A	-	A	D	D	A	D	-	A	A	D	A	D	D	A	A	-
2	D	T	A	D	D	A	-	T	D	T	A	A	T	A	-	T	T	A	T	A	D	T	T	-
3	A	D	T	A	A	T	T	-	-	D	T	T	D	T	-	D	D	T	D	T	T	D	D	A
4	T	D	D	T	T	D	A	-	-	D	D	D	D	D	T	A	A	D	A	D	D	A	D	T
5	D	T	A	D	D	A	-	T	-	T	D	D	T	D	-	-	T	D	T	-	A	T	T	-
6	A	D	T	D	A	T	-	-	-	D	T	T	D	T	-	D	D	T	D	-	T	D	D	A
7	T	A	D	T	T	D	-	-	-	D	D	D	D	D	-	A	A	D	A	D	D	A	-	T
8	D	D	A	D	-	A	A	-	A	T	D	D	T	A	-	T	T	D	T	-	A	T	-	A
9	A	T	T	A	D	-	-	-	A	D	T	T	D	T	A	D	D	T	D	-	T	D	A	A
10	T	D	D	T	T	D	-	-	T	D	D	D	A	D	-	A	A	D	A	-	D	A	A	T
11	D	D	A	D	D	A	-	T	D	T	D	A	T	A	A	T	T	D	T	A	A	T	T	A
12	A	T	T	A	D	-	-	-	A	D	T	T	D	T	A	D	D	T	D	T	T	D	D	A
13	T	D	D	T	T	A	A	A	T	D	D	D	A	D	T	A	D	D	A	D	D	A	A	T
14	D	D	D	D	D	A	A	-	D	T	D	D	T	A	-	T	T	A	T	A	D	T	T	-
15	A	T	T	D	D	T	T	A	A	D	T	T	D	T	A	D	D	T	D	-	T	D	D	A
16	T	A	D	T	T	D	A	A	T	A	D	D	D	-	T	A	D	D	A	D	D	D	D	T
17	D	D	D	D	D	A	A	T	D	T	A	D	T	D	A	T	T	A	T	A	A	T	T	D
18	D	T	T	A	D	T	T	A	A	D	T	T	D	T	A	D	D	-	D	T	T	D	D	A
19	T	D	D	T	T	D	A	A	T	D	D	D	D	D	-	A	D	D	A	D	D	D	D	T
20	D	D	D	D	D	A	A	T	D	T	D	A	T	A	-	T	T	A	T	-	D	T	T	A
21	D	T	T	D	A	T	-	A	A	D	T	T	D	T	A	D	D	T	D	T	T	D	D	A
22	T	D	D	T	T	D	-	A	T	A	D	D	D	D	-	D	D	D	A	D	D	D	D	T
23	D	D	D	D	D	A	A	T	D	T	D	D	T	A	-	T	-	A	T	A	D	T	T	D
24	A	T	T	-	A	T	-	D	D	D	T	T	D	T	A	D	D	T	D	T	T	D	D	-
25	T	A	D	T	T	A	A	A	T	D	D	D	D	D	-	-	D	D	D	D	D			T
26							A							D	A									
Totals																								
-				1	1	2	12	9	6					1	14	2	1	1		7			2	5
A	6	4	4	4	4	10	11	9	6	3	2	3	3	6	9	7	4	5	8	5	4	5	4	10
D	10	13	13	11	11	7		1	7	14	15	14	14	11		9	13	12	9	8	13	11	11	2
T	9	8	8	9	9	6	3	6	6	8	8	8	8	8	3	7	7	7	8	5	8	8	7	8

	Set																						
Trap	**31**	**34**	**35**	**36**	**37**	**39**	**40**	**41**	**42**	**43**	**46**	**47**	**49**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
1	T	-	A	D	T	-	T	A	T	T	D	D	A	D	A	T	-	D	A	T	T	-	-
2	D	-	T	D	D	T	A	T	A	D	A	A	T	D	T	D	-	T	T	D	D	D	-
3	A	-	D	T	A	A	D	D	A	D	-	T	D	T	A	A	-	D	D	A	D	-	A
4	T	T	D	D	T	A	-	A	T	T	A	D	A	D	A	T	A	A	A	T	T	T	A
5	D	T	-	A	D	T	A	T	D	D	A	A	T	D	T	D	T	T	-	D	D	-	T
6	A	T	D	T	A	A	D	D	A	A	T	T	A	T	A	A	-	D	D	A	A	-	A
7	T	T	A	D	T	A	T	A	T	T	-	D	A	D	A	T	-	A	A	T	T	-	A
8	D	T	T	A	D	T	A	T	D	D	A	A	T	A	T	D	-	T	T	D	D	-	T
9	A	T	A	T	A	A	D	D	D	D	T	T	D	T	D	D	A	A	-	A	D	-	A
10	T	T	A	D	T	A	T	A	T	T	-	D	A	D	-	T	A	A	A	T	T	-	A
11	D	T	T	A	D	T	D	T	D	D	-	D	T	A	T	D	T	T	T	D	D	-	T
12	A	T	A	T	-	D	-	D	D	A	-	T	A	T	A	A	A	D	D	A	A	-	-
13	T	T	A	D	T	A	T	A	T	T	A	D	A	D	A	T	-	D	D	T	T	-	-
14	D	T	T	A	D	T	D	T	A	D	A	A	T	A	T	-	-	T	T	D	D	-	-
15	A	T	D	T	A	D	D	D	D	A	T	T	A	T	D	A	-	D	D	D	D	-	A
16	T	T	A	D	T	D	T	D	T	T	A	D	A	D	A	T	A	A	D	T	T	-	-
17	D	T	T	D	D	T	A	T	D	D	-	D	T	D	T	A	T	T	T	D	D	-	-
18	D	T	A	T	A	D	D	D	D	A	-	T	A	T	D	A	A	D	D	A	A	-	-
19	T	T	A	D	T	D	T	D	T	T	-	D	A	D	A	T	A	A	-	T	T	T	A
20	D	T	T	A	D	T	A	T	D	D	A	D	T	D	T	A	-	T	T	D	D	A	T
21	-	T	A	T	A	D	A	D	D	D	T	T	A	T	D	A	A	D	D	D	A	A	A
22	-	T	A	D	T	D	-		T	T	A	A	A	D	A	T	-	A	-	T	T	-	A
23	D	T	T	D	D	T	A		D	D	-	D	-	D	T	-	T	T	-	D	D	-	-
24	D	T	A	T	A	D	A		D	D	T	T	-	T	D		A	D	D	T	A	-	
25	T	-		D	T	A			T	T	A	D	A		D		A	D	-	A		-	
26	D			D									-		T								
Totals																							
-	2	4	1		1	1	3				9		3		1	2	11		6			20	9
A	5		12	5	7	8	8	5	4	4	10	5	14	3	10	8	10	7	4	6	5	2	10
D	11		4	13	8	8	7	9	12	12	1	12	2	13	6	5		10	9	10	11	1	
T	8	21	7	8	9	8	6	7	9	9	5	8	7	8	9	8	4	8	6	9	8	2	4

	Set																							
Trap	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**70**	**71**	**74**	**75**	**76**	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**89**	**90**
1	-	D	A	D	D	-	-	T	A	-	-	-	T	A	A	A	D	D	A	A	-	D	T	-
2	T	A	T	D	-	-	-	D	T	T	-	-	D	T	T	T	A	A	T	T	A	A	D	T
3	-	T	D	T	T	-	-	A	D	D	-	-	D	A	D	D	T	T	D	D	T	T	A	D
4	-	D	A	D	D	-	-	T	A	-	-	-	T	A	D	A	D	D	A	A	D	D	-	A
5	T	A	T	D	A	-	-	D	T	T	-	-	D	T	T	T	A	D	T	T	A	A	A	T
6	-	T	D	T	T	-	-	A	D	D	-	A	D	A	D	D	T	T	D	A	T	T	A	A
7	-	D	A		D	-	-	T	A	A	-	T	T	A	A	A	D	D	A	A	D	D	T	-
8	-	A	T	A	A	-	-	-	T	T	-	A	D	T	T	T	D	A	T	T	A	-	A	-
9	-	T	D	T	T	-	-	A	D	D	-	-	A	A	D	D	T	T	D	-	T	T	D	A
10	-	D	D	D	D	-	-	T	A	A	-	T	T	-	A	A	D	D	A	A	D	D	T	A
11	-	A	T	A	A	-	T	D	T	T	-	-	D	T	T	T	A	A	T	T	A	A	D	T
12	-	T	D	T	T	-	-	A	D	D	T	A	A	A	D	D	T	T	D	D	T	T	A	-
13	-	D	A	A	D	-	-	T	A	A	-	-	T	A	D	A	D	D	D	A	D	D	T	A
14	-	D	T	A	A	-	-	D	T	T	-	A	A	T	T	T	A	A	T	T	A	A	D	T
15	-	T	D	T	T	-	-	A	D	A	-	A	A	-	A	D	T	T	D	-	T	T	-	A
16	-	D	A	A	D	-	-	T	A	A	-	T	T	A	D	A	D	-	D	A	D	D	T	A
17	-	D	T	D	A	-	-	D	T	-	-	A	D	-	T	T	A	A	T	T	D	A	D	T
18	A	T	D	T	T	-	-	A	D	D	-	A	A	-	D	D	T	T	D	D	T	T	A	-
19	-	D	D	D	D	-	-	T	A	D	-	T	T	-	D	D	D	A	D	A	D	D	T	A
20	-	D	T	D	-	-	-	D	-	T	-	-	D	T	T	T	D	D	T	T	D	D	-	T
21	A	T	D	T	T	-	-	A	D	A	-	A	D	A	D	D	T	T	D	D	T	T	A	A
22	-	D	A	D	A	-	-	-	D	A	-	T	T	A	D	D	D	D	D	A	D	D	T	A
23	-	D	T	A	-	-	-	D	T	T	-	A	D	-	T	-		D	T	T	A	D	A	T
24	-	T	D	T	T	-	-	D	-	D	T		A	A	A	D	T	T	D	-	T	T	A	A
25	-	D	D	D	D		-	-	A	A			T	-	D	-	D	D	D	A	-	D	T	A
26											-											D	A	
27																							D	
Totals																								
-	21				3	24	24	3	2	3	23	9		7		2		1		3	2	1	3	5
A	2	4	6	6	6			7	8	8		9	6	12	5	6	5	6	4	10	6	5	10	12
D		13	11	10	8			8	8	7			10		12	10	11	10	13	4	9	12	6	1
T	2	8	8	8	8		1	7	7	7	2	5	9	6	8	7	8	8	8	8	8	8	8	7

	Set			
Trap	91	92	94	95
1	-	T	D	-
2	A	-	D	-
3	T	A	T	-
4	D	T	D	-
5	A	A	D	A
6	T	-	T	-
7	D	T	D	-
8	A	A	A	A
9	T	A	T	-
10	D	T	D	-
11	A	-	A	-
12	T	A	T	-
13	-	T	D	-
14	A	A	A	-
15	T	-	T	A
16	D	T	D	-
17	D	-	A	D
18	T	A	T	-
19	D	-	D	T
20	A	-	A	A
21	T	A	T	-
22	D	-	D	-
23	D	A	A	-
24	T	A	T	-
25	-	T	D	-
26				
27				
Totals				
-	3	8		19
A	6	10	6	4
D	8		11	1
T	8	7	8	1

APPENDIX G DETAILS ON SABLEFISH CATCH AND NUMBERS RECOVERED, SAMPLED AND TAGGED DURING THE 2004 STANDARDIZED CHARTER (F/V OCEAN MARAUDER).

	Catch		Number		Number sampled for					Proportion	Mean fork length (mm)		
Set	Weight (kg)	Count	Recovered	Tagged	Fork length	Sex	Maturity	Otoliths	Weight	Males	Males	Females	Tagged
1	1405	470	0	0	345	345	345	47	0	0.12	604.	652	
2	639	213	0	0	71	71	71	0	0	0.24	613	654	
3	2349	800	1	0	137	132	137	0	0	0.31	604	654	
4	336	165	4	0	105	105	105	0	0	0.64	549	609	
5	227	113	2	0	111	111	111	47	0	0.68	553	617	
6	162	68	1	0	49	49	49	34	0	0.43	574	620	
7	286	103	3	0	101	101	101	43	0	0.18	588	638	
8	132	32	0	0	32	32	32	32	0	0.00		723	
9	89	29	0	0	29	29	29	29	0	0.00		656	
10	378	125	0	0	126	126	126	49	49	0.27	571	669	
11	367	160	0	0	165	165	165	46	0	0.58	555	646	
12	240	112	0	0	103	103	103	46	0	0.70	560	638	
13	962	335	2	0	133	133	133	40	40	0.36	591	646	
14	1185	356	0	0	123	123	123	37	0	0.19	604	680	
16	15	7	0	0	7	7	7	7	0	0.14	597	605	
17	444	143	0	0	113	113	113	33	33	0.19	618	665	
18	1095	381	0	0	174	174	174	53	53	0.28	606	656	
19	829	306	1	0	147	147	147	50	50	0.30	598	642	
20	130	58	0	0	58	58	58	58	58	0.52	569	628	
21	197	93	2	0	91	91	91	56	0	0.77	570	625	
22	38	11	0	0	11	11	11	11	11	0.36	660	700	
23	75	20	0	0	20	20	20	20	20	0.10	678	702	
24	136	41	0	0	41	41	41	41	0	0.39	637	693	
25	233	109	1	0	106	106	106	45	0	0.68	568	627	
26	982	514	1	0	183	183	183	57	0	0.74	551	601	
27	1247	446	1	0	122	122	122	45	0	0.53	607	655	
28	1203	413	4	0	162	162	162	68	0	0.43	610	662	
29	232	66	0	0	63	63	63	63	0	0.13	634	684	
30	135	46	0	0	46	46	46	46	46	0.13	620	643	
31	736	247	0	0	149	149	149	53	52	0.37	609	673	
32	1023	383	17	0	156	156	156	42	42	0.49	600	655	
33	523	183	1	0	129	129	129	37	37	0.36	597	655	

	Catch		Number		Number sampled for					Proportion	Mean fork length (mm)		
Set	Weight (kg)	Count	Recovered	Tagged	Fork length	Sex	Maturity	Otoliths	Weight	Males	Males	Females	Tagged
34	244	88	0	0	84	84	84	41	0	0.40	593	674	
35	49	16	0	0	16	16	16	16	0	0.44	631	666	
36	118	32	0	0	32	32	32	32	31	0.28	645	713	
37	22	5	0	0	5	5	5	5	5	0.00		750	
38	98	26	0	0	26	26	26	26	0	0.38	659	731	
39	197	67	0	0	67	67	67	67	0	0.57	636	666	
40	620	211	1	0	127	127	127	42	41	0.44	603	670	
41	1338	461	2	0	199	199	199	76	76	0.34	611	652	
42	992	317	0	0	151	151	151	65	65	0.17	611	661	
43	48	13	0	0	13	13	13	13	13	0.15	654	697	
44	70	18	0	0	18	18	18	18	0	0.11	680	709	
45	1850	545	0	0	158	158	158	60	60	0.27	621	692	
46	942	305	0	0	142	142	142	51	51	0.36	617	667	
47	667	252	1	0	144	144	144	53	53	0.56	599	662	
48	247	86	0	0	89	89	89	51	51	0.58	608	673	
49	94	33	1	0	32	32	32	32	32	0.56	627	693	
50	61	18	0	0	18	18	18	18	18	0.28	646	709	
51	83	23	0	0	23	23	23	23	0	0.17	650	695	
52	204	90	1	0	90	90	90	49	0	0.67	561	659	
53	446	141	0	0	140	140	140	48	0	0.36	616	684	
54	1046	349	2	0	157	157	157	47	0	0.34	605	663	
55	821	230	1	0	163	163	163	54	0	0.23	628	680	
56	456	139	0	0	117	117	117	47	0	0.32	595	675	
57	54	12	0	0	12	12	12	12	0	0.08	647	728	
58	79	19	0	0	19	19	19	19	0	0.16	686	734	
59	75	25	0	0	25	25	25	25	0	0.40	593	694	
60	85	25	0	0	25	25	25	25	0	0.32	600	713	
61	707	260	0	0	136	136	136	52	52	0.63	592	664	
62	1260	409	1	0	152	152	152	49	49	0.34	617	666	
63	21	4	0	0	4	4	4	4	4	0.00		746	
64	965	255	1	0	124	124	124	45	45	0.19	632	704	
65	81	36	0	25	10	10	10	10	0	0.14	573	577	586
66	631	261	0	157	57	57	57	57	57	0.08	554	608	597
67	1662	698	0	392	64	64	64	64	64	0.04	570	609	597
68	2364	942	1	441	62	62	62	62	62	0.03	582	610	604
69	2131	789	3	385	62	62	62	62	62	0.02	587	628	621

	Catch		Number		Number sampled for					Proportion	Mean fork length (mm)		
Set	Weight (kg)	Count	Recovered	Tagged	Fork length	Sex	Maturity	Otoliths	Weight	Males	Males	Females	Tagged
70	1438	559	1	238	61	61	61	61	60	0.08	582	630	601
71	1953	737	5	378	79	79	79	79	79	0.05	560	617	623
72	1145	439	2	219	54	54	54	54	54	0.07	588	619	615
73	1587	560	3	294	57	57	57	57	57	0.08	594	646	624
74	1861	717	3	321	76	76	76	76	76	0.06	588	654	600
75	883	389	3	167	58	58	58	58	58	0.04	553	595	582
76	1020	458	6	225	73	73	73	73	73	0.10	557	607	579
77	1109	461	7	213	70	70	70	70	70	0.06	556	609	597
78	1051	455	3	217	49	49	49	49	49	0.08	544	591	589
79	1390	561	10	305	65	65	65	65	64	0.07	549	641	597
80	303	163	3	62	53	53	53	53	53	0.17	532	584	556
81	535	281	6	174	58	58	58	58	58	0.06	545	576	557
82	764	357	2	169	60	60	60	60	60	0.10	530	603	575
83	1098	531	8	267	51	51	51	51	51	0.06	540	571	574
84	1191	539	19	220	65	65	65	65	65	0.03	537	586	581

APPENDIX H DETAILS ON SABLEFISH CATCH AND NUMBERS RECOVERED, SAMPLED AND TAGGED DURING THE 2004 TAGGING CHARTER (F/V MILBANKE SOUND).

	Catch		Number		Number sampled for				Proportion	Mean fork length (mm)		
Set	Weight (kg)	Count	Recovered	Tagged	Fork length	Sex	Maturity	Otoliths	males	Males	Females	Tagged
1	598	267	6	88	59	59	59	59	0.68	560	620	576
2	1756	615	0	194	78	78	78	78	0.53	606	660	618
3	985	472	0	183	49	49	49	49	0.84	555	608	559
4	793	296	1	113	53	53	53	53	0.28	584	638	613
5	2118	884	4	297	0	0	0	0				598
6	2372	809	2	793	0	0	0	0				624
7	1940	599	0	185	68	68	68	68	0.22	608	663	645
8	2892	1008	0	205	0	0	0	0				630
9	395	110	0	27	43	43	43	43	0.09	625	680	672
10	107	23	0	7	17	17	17	17	0.06	710	732	690
11	353	101	0	30	54	54	54	54	0.06	569	678	651
12	768	215	0	48	63	63	63	63	0.16	608	680	656
13	1526	475	1	178	59	59	59	59	0.37	617	662	633
14	2217	761	3	257	55	55	55	55	0.55	591	662	615
15	1224	531	0	166	61	61	61	61	0.36	543	601	583
16	1533	578	1	227	35	35	35	35	0.51	582	666	591
17	4374	1748	18	994	0	0	0	0				590
19	760	262	1	91	51	51	51	51	0.25	582	650	631
20	34	16	0	3	11	11	10	11	0.09	518	631	599
21	738	241	0	71	58	58	58	58	0.28	578	646	616
22	919	418	0	143	64	64	64	64	0.39	537	600	565
23	1981	726	3	333	0	0	0	0				608
24	628	233	0	63	54	54	53	54	0.20	588	631	623
25	575	201	0	68	50	50	50	50	0.42	577	670	627
26	100	50	0	17	13	13	13	13	0.69	541	603	563
27	1196	347	1	118	68	68	68	68	0.37	616	686	656
28	725	278	0	87	55	55	55	55	0.75	599	641	613
29	795	233	0	57	51	50	51	51	0.18	643	674	665
30	375	87	0	30	49	49	49	49	0.18	658	704	697
31	532	188	0	58	35	35	35	35	0.60	615	624	637

	Catch		Number		Number sampled for				Proportion	Mean fork length (mm)		
Set	Weight (kg)	Count	Recovered	Tagged	Fork length	Sex	Maturity	Otoliths	males	Males	Females	Tagged
32	3377	1139	1	317	0	0	0	0				605
33	2472	846	2	793	0	0	0	0				622
34	462	182	1	183	0	0	0	0				597
35	297	87	0	21	47	47	47	47	0.28	612	667	664
36	1031	332	2	91	50	50	50	50	0.64	622	624	644
37	467	123	0	62	35	35	35	35	0.66	638	695	694
39	612	184	0	58	57	57	57	57	0.44	639	699	655
40	406	116	0	20	44	44	44	44	0.34	625	704	659
41	613	213	0	59	60	60	60	60	0.40	586	631	623
42	894	482	6	154	32	32	32	32	0.88	555	640	550
43	1365	475	3	213	62	62	62	62	0.77	605	636	613
44	2164	797	8	319	0	0	0	0				605
45	3041	1415	8	1044	0	0	0	0				565
46	184	38	0	10	27	27	27	27	0.00		777	750
47	604	260	1	87	53	53	53	53	0.66	563	621	592
49	287	83	0	24	47	47	47	47	0.55	652	705	670
50	2209	802	1	309	0	0	0	0				631
51	851	317	1	104	52	52	51	52	0.79	583	686	631
52	320	135	0	48	49	49	49	49	0.65	562	635	601
53	266	86	0	26	26	26	26	26	0.31	614	656	645
54	156	49	0	13	34	34	34	34	0.15	616	654	654
55	653	212	0	71	52	52	52	52	0.42	596	670	643
56	656	225	1	77	48	48	48	48	0.60	595	676	630
57	898	254	1	85	54	54	54	54	0.46	640	697	653
58	680	269	0	70	45	45	45	45	0.80	576	605	582
59	47	13	0	5	3	3	3	3	0.00		641	660
60	102	24	0	5	19	19	19	19	0.32	688	716	721
61	22	5	0	3	2	2	2	2	0.50	770	764	650
62	986	311	1	94	57	57	57	57	0.35	615	670	645
63	781	275	1	101	49	49	49	49	0.61	617	651	625
64	637	238	0	88	49	49	49	49	0.94	577	673	607
65	466	141	0	53	54	54	54	46	0.63	623	668	648
67	4	1	0	1	0	0	0	0				681

	Catch		Number		Number sampled for				Proportion	Mean fork length (mm)		
Set	Weight (kg)	Count	Recovered	Tagged	Fork length	Sex	Maturity	Otoliths	males	Males	Females	Tagged
68	612	191	0	27	71	71	70	71	0.49	615	681	630
69	2632	768	3	300	0	0	0	0				653
70	409	116	0	27	51	51	51	51	0.41	668	692	679
71	574	178	0	57	53	53	53	53	0.47	640	668	645
72	2662	766	2	761	0	0	0	0				656
73	1012	298	3	228	0	0	0	0				643
74	8	2	0	3	0	0	0	0				702
75	128	39	0	12	26	26	26	26	0.38	647	702	662
76	1022	338	2	127	62	62	62	62	0.40	612	652	630
77	2706	954	1	298	0	0	0	0				609
78	122	39	0	14	25	25	25	25	0.52	623	669	655
79	880	319	2	119	58	58	58	58	0.78	618	651	622
80	619	179	2	61	54	54	54	53	0.30	621	681	664
81	726	263	1	72	55	55	55	55	0.55	598	672	626
82	532	305	12	110	47	47	46	47	0.85	527	610	540
83	776	319	2	125	55	55	55	55	0.71	554	647	577
84	295	104	3	38	42	42	42	42	0.62	597	643	622
85	642	284	3	80	56	56	56	56	0.71	560	661	592
86	696	228	0	94	56	56	56	56	0.64	601	675	628
87	2177	743	1	742	0	0	0	0				617
88	1997	695	1	559	0	0	0	0				625
89	389	114	0	33	44	44	44	44	0.64	639	688	666
90	206	66	2	25	32	32	32	32	0.53	612	693	598
91	606	178	0	52	45	45	45	45	0.31	624	665	651
92	149	41	0	16	25	25	25	25	0.24	654	701	679
93	2090	723	0	309	0	0	0	0				629
94	1005	306	1	139	53	53	53	53	0.32	623	680	637
95	50	12	0	3	9	9	9	9	0.22	656	693	671

APPENDIX I TRAP GEAR GLOSSARY

Anchor: Bundle of chains weighing approximately 60 kg (90 lb) that is attached to the groundline on the becket before the first trap and after the last trap. The anchors prevent drifting and sliding of the groundline.

Anchorline or buoyline: A 549 m (300 fm) long 22 mm (7/8 in.) 3-ply polypropylene rope permanently attached to the groundline at the first and last becket. This line retrieves the anchor and groundline.

Baitbag: 15 x 20 cm (6 x 8 in.) 3.175 mm (1/8 in.) mesh bag with a nylon drawstring and no. 72 stainless steel halibut longline snap.

Becket: 13 mm (1/2 in.) diameter two-in-one braided nylon rope spliced into the groundline every 46 m (150 ft). Each becket forms a loop of approximately 15 cm (6 in.).

Buoy: 60 to 90 cm (2 to 3 ft) diameter Bright orange inflatable plastic bladders used in combinations of two or three to suspend the sinkerline and buoyline.

Bridle: 13 mm (1/2 in.) 3-ply polypropylene rope "double" fastened at three points to the top hoop of the trap and knotted at a single point to form a loop of approximately 158 cm (62 in.) long with a snap bent on to the end. This bridle is fastened onto the top hoop in such a manner that pressure is inward on the tunnel when the trap is being retrieved.

Drum: Large capacity spool or drum that stores 3 to 5 complete anchor and groundline combinations.

Escape panel: 12 meshes of the trap web located in the upper half of one of the panels opposite the tunnel and cut along the horizontal bar to make a triangular opening of approximately 25 cm (10 in.) when allowed to hang loose. The cut is laced closed with a single piece of 2 mm cotton "butcher" twine. The purpose of the panel is to create an opening when the cotton twine rots if the trap is lost while fishing, i.e., to prevent ghost-fishing.

Flagpole: Attached to buoys and helps to locate the end of the string.

Groundline: 22 mm (7/8 in.) 3 ply polypropylene rope of various lengths depending on the depth of the set.

Hauler or power block: Hydraulic powered pulley that hauls all the line at approximately 30 m (100 ft) per minute aboard the vessel prior to winding or storing on the drum.

Ring: 52 mm (2 in.) diameter 8 mm (5/16 in.) stainless steel ring bent or knotted onto becket.

Shotline: Additional pieces of 22 mm (7/8 in.) polypropylene rope used to extend the anchor or buoyline, usually 91 m (50 fm) or 183 m (100 fm) long.

Sinkerline: 19 mm (3/4 in.) 3-ply nylon rope attached to the top of the buoyline or shotlines. The purpose of this line is to prevent the polypropylene anchor or buoyline from floating and "puddling" on the surface and posing a hazard to navigation. The line is usually 91 m (50 fm) or 183 m (100 fm) long.

Snap: Galvanised cast steel device with ring on one end and a spring loaded enclosure on the other end strong enough to withstand a 1400 kg (3000 lb) strain.

Traps: The traps are a Korean design adopted and modified by local fishers to local conditions. They are designed and constructed to stack into each other when transported or stored. The traps are constructed of mild steel rod welded at all junctures. The top hoop diameter is 84 cm (33 in.), the bottom hoop diameter is 137.2 cm (54 in.), and the 6 vertical members are 79 cm (31 in.) long giving the trap a 74 cm (29 in.) vertical height. Horizontal bars are attached midway between the top and bottom hoops in 5 of the 6 vertical panels. The trap is covered or caped with a single piece of black nylon #48 thread 70 mm web (measured inside the knots when the web is stretched flat). This is fastened to the frame so that the top is permanently closed and the bottom can be opened and closed with a draw string. The one side panel without a horizontal bar is not covered with web and accommodates the trap entrance or tunnel. The tunnel is constructed of two pieces of green 44 mm (#18) knotless braided web. The two seams of the tunnel are fastened together prior to attaching to the frame of the trap. When the tunnel is fastened to the trap it slopes downward with a 36 cm (14 in.) opening or slit. The bottom part of the slit will be taut and the top will be loose when the tunnel is stretched into place from the opposite panel of the trap. The tunnel extends 64 cm (25 in.) into the trap. When the trap is prepared for fishing both the tunnel lines and the bottom closing line (4 mm braided single-ply polypropylene twine) are pulled taut, looped together and knotted at a single point. The tunnel and bottom closing lines are of sufficient length to allow the bottom and the tunnel to collapse completely against the inside of the trap to allow for stacking. One of the panels opposite the tunnel contains the escape panel (defined above). Chafing line (10 mm (3/8 in.) and 13 mm (1/2 in.) diameter 3-ply polypropylene) is wrapped around all the frame members to protect the web after the trap is covered.

(Descriptions were modified from Smith et al. 1996)